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Calendar anomalies - Evidence from the Nairobi Securities Exchange

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

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ABSTRACT

Calendar anomalies are a phenomenon that seem to suggest that financial securities such as stocks, bonds and even derivatives, experience patterns of returns that coincide with particular points in the week, month or year. Previous studies have suggested that these effects are unique to certain markets and even within those geographical markets, are specific to certain financial products. The reason that calendar effects are considered of particular interest to researchers is twofold: first, they disprove traditional theories that support the existence of efficient markets and second, they offer insight to those who wish to take advantage of arbitrage opportunities to make a profit.

The goal of this research thesis was to check the Nairobi Securities Exchange for calendar anomalies. In the event that they exist, the paper is meant to proceed and describe the magnitude of these effects. Should there not have been any effects, this research thesis intended to provide evidence to support that position. This evidence would enable scholars, policy makers and investors aware of what market they are operating in with regard to calendar anomalies.

The specific calendar anomalies tested were the day of the week effect and the month of the year effect. These effects were tested in the NSE 20 index and the individual stocks of the Nairobi securities exchange.

The results find very slight and diminishing effects in the index. Higher returns were noted in January and Friday going on to Monday. In the individual stocks, Friday was noted as the day with the highest return. However, the anomaly in individual stocks is recorded at very low levels; are as such were not significant to alter a rational investor's decision.

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CHAPTER ONE: INTRODUCTION TO THE STUDY

1.1. INTRODUCTION

The Efficient Markets Hypothesis (EMH) was largely proposed by Eugene Fama in his famous paper from 1970. Fama (1970) reported the EMH theory as a 'fair game model', which indicates that the investors are confident regarding to the current market price which fully replicates all available information regarding to a security. Moreover the expected returns are based upon this price which is consistent with its risk. Fama divided the empirical tests of the hypothesis into three categories based on the given information set i) weak-form EMH, ii) Semi-strong-form EMH and iii) Strong-form EMH. Further to this, he suggested the the Random Walk Model (RWM); a model which assumes that subsequent price changes are sovereign and homogeneously distributed random variables and concludes that changes in future prices cannot be forecasted through historical price changes and movements.

The basic theoretical case for EMH lies on three main assumptions: investors are assumed to be rational and hence to value securities rationally, to the extent that some investors are not rational, their trades are random and thus cancel each other without affecting prices, and finally, to the extent that investors are irrational similarly, their influence on prices is eliminated by rational arbitrageurs (Shleifer 2000).

The EMH holds that asset prices rapidly change in adjustment to information and thus should move in an unpredictable, irregular pattern. If a foreseeable pattern exists, profit-maximizing investors would notice the pattern and price the assets in anticipation; when prices reflect the anticipation, the pattern would vanish. (Jain 1986).

After its infancy, the EMH turned into a huge success and a vast amount of studies emerged supporting the hypothesis. However, the theory soon began to face both theoretical and empirical challenges. As an example of contradicting findings, studies started to record consistent abnormal returns based on seasonal patterns for financial asset returns. For example, studies by French (1980), Gibbons and Hess (1981) and Keim and Stambaugh (1984) discovered the average returns in the USA to be significantly negative on Monday and significantly positive on Friday. Rozeff and Kinney (1976) were the found abnormally high returns in January while studying the performance of the New York Stock Exchange. These seasonal patterns in returns became clear contradictions to the EMH which proposed that prices should ideally not be predictable based on certain time periods.

This predictability, and specifically according to time periods, gives rise to what is referred to as calendar anomalies. An anomaly as used in regular English is a deviation from the normal. In theory it cannot exist in an efficient market. Deviations however, do exist, and do concord with the efficient capital market theory, if the deviation is randomly distributed according to Fama (1970). However the problem is to determine when a deviation is no longer a deviation but an anomaly. A general clear and accepted definition of anomalies does not exist, but some have tried to define it:

"An asset pricing anomaly is a statistically significant difference between the realized average returns associated with certain characteristics of securities, or on portfolio of securities formed on the basis of those characteristics, and returns that are predicted by a particular asset pricing model" (Borges 2008).

Gugten (2010) proposes that the regularities mentioned above can further be categorised into: firm anomalies, accounting anomalies, event anomalies, weather anomalies and calendar anomalies.

According to Levy and Post (2005), firm anomalies are a consequence of firm-specific characteristics. One well known firm anomaly is the size effect, which states that returns on small firms are higher compared to returns on large firms, even after risk-adjustment.

Accounting anomalies relate to stock price movements after the release of accounting information. An example of an accounting anomaly is the earnings momentum anomaly, which implies that firms with a rising growth rate of earnings are likely to have stocks that outperform the market. Another accounting anomaly is that if the market-to-book value (M/B) ratio is low, the stocks are likely to outperform the market (Levy and Post 2005).

Event anomalies relate to price movements after an obvious event. This can be for example the announcement that a firm will be listed on a major stock exchange. After such an announcement, the price of the stock rises.

Weather anomalies relate to stock price changes during certain weather conditions. Yuan, Zheng and Zhu (2006), for example, find a relationship between stock returns and lunar cycles, looking at stock indices of 48 countries around the world for the period January 1973 to July 2001.

According to the definition advanced by Islam and Watanapalachaikul (2005), calendar anomalies refer to regularities that appear in the trading stocks which can influence stock market returns.

According to Agrawal (1994), calendar anomalies are also defined as any regularity or consistent pattern that cannot be defined by means of any accepted theory of finance. Schweret (2002) defines calendar anomalies as empirical [stock return] whose results seem to be inconsistent with maintained theories of asset-pricing behaviour.

The interest and susequent studies of calendar anomalies led to the popularisation of behavioural finance. Behavioural finance typically refers to studies that reject one or more of the underlying axioms behind the modern finance theory which is built on a neoclassical framework (Burton 2003).

Burton (2003) further suggests that calendar anomalies can be supported by the observation of systematic patterns of security returns around certain calendar points. These calendar points can be at a particular day of the week, month of the year, half of the year. They may even be clustered points around a particular date that may represent a public holiday or calendar event unique to a particular country.

Following the discovery of the various types of anomalies, numerous studies have been undertaken to challenge financial market informational efficiency, and more specifically- explore the calendar anomalies- each described by the calendar point at which it is observed. These studies have established several calendar anomalies. Two of them are mentioned below.

The *'Month-of-the-year effect'* which also covers the *'January effect'* was first described in 1942 by Wachtel in his article "Certain observations on Seasonal Movements". The fundamental pattern of this anomaly is that stock returns in the first few days of January are higher, ranging from four to ten days (Mlambo 2006). This pattern results in the occurrence of higher returns for January than the rest of the months in the year. However the recognition of a January effect did not happen until Rozeff and Kinney observed and documented it in 1976 (Ogden, 1990). Since then this anomaly has become one of the most researched anomaly.

The '*Day of the week*' effect, which also covers what is called the Friday effect and the Monday effect. According to Gibbons and Hess (1981), the fundamental idea of this anomaly is that stock returns on particular days are higher or lower than the rest of the week. Pilbeam (2006) found statistical significant evidence that share prices tend to fall on Mondays and rise on Fridays. Due to this proposition, some literature refers to this effect as the '*Weekend effect*'.

Along with the aforesaid calendar effects, several hypotheses have emerged to offer possible explanations for existence of these anomalies. One hypothesis why investors (especially institutional investors) may make seasonal related changes in their portfolios is the practice often referred to as 'Window Dressing'. According to the window-dressing hypothesis, developed by Haugen and Lakonishok (1988), institutional managers are evaluated based on their performance and their investment philosophy. The authors suggest that to improve their performance, the institutions buy both risky stocks and small stocks but sell them before the end of the year so that they do not show up in their year-end holdings. At the beginning of the following calendar year (in January), investment managers reverse the process by selling winners, large stocks, and low risk stocks while replacing them with small and risky stocks that typically include many past losers.

Ritter (1991) suggests that the patterned returns may be related to customs that influence the flow of funds in and out of the market. For example, pension funds and mutual funds may receive payments and make corresponding changes in their portfolios at dates that coincide with the calendar points.

Closely related to this reason is that of tax loss harvesting by investment managers. The tax loss selling hypothesis is offered as an explanation for the January effect Branch (1977). According to him, investors, wanting to realize capital losses in current tax year, create a downward price pressure at the yearend (December) on securities that have previously experienced negative return. Subsequently, at the beginning of the new tax year (January), this selling pressure is relieved and the affected securities earn excess return as their prices rebound.

Another reason given for the seasonal movements is the systematic arrival of good and bad news in the market. According to Rozeff and Kinney (1976), the excess returns are the effect of significant information releases that occur at a particular time. This reason seems most plausible for the weekend effect where if the announcement of bad news is postponed until after the close of trading on Friday, it may cause a downward pressure on prices on Friday.

In spite of the explanatory hypotheses given, there are no universally accepted explanations for calendar anomalies, and a number of other factors have been found as potential contributors: measurement errors, differences in settlement time of transactions, taxes, capitalization, riskiness of the stock, company-type etc. (Mills, Markellos and Harizanis 2000).

As would be expected, one of the most rigorous critics of behavioural finance, and by extension-calendar anomalies has been Eugene Fama, the father of the EMH. Fama (1997) criticised behavioural finance especially for the following reasons: First, he argued that the discovered anomalies were just as often due to under reaction as overreaction with the securities market. Second, he stated that anomalies tend to disappear over time or when different methodology is used. He also accuses that behavioural finance does not explain the big picture and the behavioural school has not provided a competing theory, which itself would be rejectable by empirical tests.

Bildik (2004) asserts that calendar anomalies indicate either market inefficiencies or inadequacies in the underlying asset pricing model and reminds us that recorded anomalies tend to disappear, reverse or fade over time, as discovered by Schwert (2003).

1.2. PROBLEM STATEMENT

The efficient market hypothesis has been the underlying proposition of finance nearly four decades. It assumes that stock prices adjust rapidly to the arrival of new information, and thus, current prices 'fully reflect' all available information. The basic theoretical case for EMH lies on three main assumptions: investors are assumed to be rational and hence to value securities rationally, to the extent that some investors are not rational, their trades are random and thus cancel each other without affecting prices, and finally, to the extent that investors are irrational similarly, their influence on prices is eliminated by rational arbitrageurs.

Consequently, the EMH has a plain message for average investors: "You cannot hope to consistently beat the market, and resources used to analyzing, picking and trading securities are useless".

Several authors have disproved the Efficient Market Hypothesis (EMH) by showing seasonality in the returns of stocks. The presence of a calendar anomaly in a stock market would provide an opportunity for market timing as strategy for investors; investors could buy stocks on days (months) with abnormally low returns and sell on days (months) with abnormally high returns. Market timing as a viable investment strategy further disproves the EMH.

As described in the latter part of the introduction, some researchers have disputed calendar anomalies and suggest that these anomalies tend to disappear over time. The diminishing of calendar effects over time is an indication of an increase in informational efficiency. As such, findings to this end would support the EMH since the market would seem to be undergoing a gradual elimination of the market timing opportunity. The presence or absence of calendar anomalies can therefore be used to determine the level of market efficiency.

This study intends to test for the presence of calendar anomalies in the Nairobi Securities Exchange. The extent to which these anomalies are present or absent will provide an indication as to how much room there is for timing strategies for stock trading. Additionally, the trend with regard to the strength of these anomalies over time would show the growth of market efficiency in the securities market.

1.3. RESEARCH OBJECTIVES

The general objective of this study is to establish whether the two calendar effects are present in the equities market at the Nairobi Securities Exchange and use the results to deduce the level of market efficiency in the stock market. In order to achieve this objective, specific objectives will also be tackled. They include:

1. To establish whether the Nairobi Securities Exchange is prone to the day of the week and month of the year effect.
2. To identify, if any, the stocks most prone to the day of the week and month of the year effects in the Nairobi Stock Exchange

1.4. RESEARCH QUESTIONS

1. Does the Nairobi Securities Exchange 20 share index exhibit the day of the week and month of the year effects?
2. Which company stocks are most prone to the day of the week and month of the year effect in the Nairobi Securities Exchange?

1.5. SCOPE OF THE STUDY

This study will be based on the Nairobi Securities Exchange. The specific population of study will be the companies listed in the equity market. The calendar anomalies will be investigated for a period of 13 years between 2001 and 2013.

The data would be obtained from the Nairobi Securities Exchange. The anomalies to be investigated are the 'Day-of-the-week' effect and the 'Month-of-the-year' effect.

1.6. SIGNIFICANCE OF THE STUDY

By establishing the types of calendar anomalies in the Nairobi Securities Exchange, a greater amount of information regarding market timing and stock returns relationship will be available. The possible benefactors of this information will be:

1.6.1. Fund managers and Investors

If the equities that are party to these anomalies are established, portfolios that hold such equities can be re-balanced to avoid (or target) the volatility from these stocks during the periods of the seasonal movements.

The knowledge gained would be useful to fund managers and individual investors when picking their ideal portfolios and timing their equity sales purchases.

1.6.2. Policy bodies

The presence or absence of seasonal patterns in stock returns could be a pointer to the level of informational efficiency in the Nairobi Securities Exchange. Areas of investor education could be identified and reports on returns could be generated to give all categories of investors a 'level playing field'

CHAPTER TWO: LITERATURE REVIEW

2.1. HISTORY OF CALENDAR ANOMALIES

Calendar anomalies refer to the observation that over time, average stock returns for a particular period are different from other trading periods, a phenomenon that contradicts the efficient market theory, since investors can adjust their buying and selling strategies accordingly to increase their returns. (French 1980)

Calendar anomalies comprise one widely studied set of pricing anomalies. Calendar anomalies arise from the observation of systematic patterns of security returns around certain calendar points.

2.2. DAY-OF-THE-WEEK EFFECT

Kelly (1930) and Cross (1973) were among the first to document stock return regularities as a function of the day of the week. Kelly (1930) recognized that the average daily return of the market is not alike for all trading days. He examined a sample of 844 weeks (1953-1970) of returns data for the Standard and Poor's Composite Index for regularities in magnitude and direction of price changes on different days and dependence of the index's performance on a given day to its performance on the previous day.

Following the revelation that inter-day returns varied in a patterned way, the next series of studies examined the relationship between the trading days' returns: Was there a relationship among the various trading day returns? Cross (1973) found that the index performance on Monday was dependent on the previous Friday's performance. Over the study period, the index had an equal chance of increasing or declining on Monday given that the index had increased the previous Friday, but given a decline on Friday, the index had only a 0.24 likelihood of increasing on Monday. In the same index, Gibbons and Hess (1981) confirmed the day of the week effect with their sample between 1962-1978. Keim and Bamstaugh (1984) also confirmed the results using the same S&P 500 Index as French, but extending his sample period from 1953 - 1977 to 1928 -1982.

The dependence between successive trading days most naturally required an explanation. In a bid to investigate the reasons as to why such relationships existed, French (1980) tested two hypotheses of the process that generates stock returns, the trading time and the calendar time hypotheses. Under the trading time hypothesis, the investor receives returns based on the number of trading days the security is held, and the expected value of daily returns should be equal among the five trading days in a week. Under the calendar time hypothesis, the investor is compensated based on the number of calendar days the stock is held. Thus, Monday's returns should reflect returns for three days and should have an expected return equal to three times that of the other four days.

Early work in day-of-the-week effects in stock markets was very consistent in finding a significantly positive return on Fridays and a significantly negative return on Mondays.

However, over the years, as researchers developed new datasets and statistical methods, the reported effects began to reverse, migrate to other days, and even vanish. Haugen and Jorion (1996) point out that one should expect that calendar effects are short-term phenomena due to the learning of market participants. If investors, based on past experience, become aware of calendar anomalies and can run trading strategies, such effects should disappear over time.

Previously proposed explanations also lost their appeal, even in sample periods showing the traditional weekend effect.

There are at least two possible explanations for the loss of the day-of-the-week effect. The first is that the early critics who dismissed the effects as spurious or the result of data mining were possibly correct. A second possible explanation is that investors pay attention to patterns in security prices, and when they are publicized enough, act on those patterns and cause those patterns to change or disappear. This explanation may offer new hope for weak-form informational market efficiency called into question by calendar anomalies.

2.2.1. Empirical study findings: Day of the week

In general, the empirical studies on this issue can be divided into two groups. The first group has shown negative return on the first day of the week and positive in the latter half. In contrast, the second group has shown positive return on the first half of the week and negative on the last half of the week.

2.2.2. Positive return: End of the week

Among those who find a positive return at the end of the week include (Cross 1973) who observed negative returns on Mondays in the US stock market. French (1980) further proved that the returns on Mondays were significantly negative and while the returns on other four days of the week were positive. However, he also found the existence of other day-of-the-week effects such as Tuesday, Wednesday and Thursday effects in other countries and studies as long as the returns are significantly positive or negative.

Poshakwale (1996) examined the day of the week effect in Bombay Stock Exchange over a period 1987-1994. He found that the returns achieved on Fridays are significantly higher than the rest of the trading days of the week. Another study by Berument and Kiymaz (2001) investigated the day of the week effect in stock market volatility by examining the S&P 500 stock index during the period of January 1973 and October 1997. They found that the day of the week effect is present in both volatility and return equations. They observed that the highest and lowest returns are on Wednesday and Monday respectively, while the highest and the lowest volatility are observed on Friday and Wednesday, respectively. Furthermore, Ndu (2006) used parametric and nonparametric tests to examine the day-of-the-week effect in Czech Republic, France; Italy; Slovakia; Spain; Turkey and United Kingdom. He confirmed that there is a presence of the day of the week effect for seven of the European financial markets as they experienced negative return on Monday.

Berument (2003) tested the day of the week effect on return and volatility for Istanbul Stock Exchange through the period from 1986 to 2003. He found that there is a day of the week effect. Friday has the highest return and Monday has the lowest return compared to return on Wednesday. In regard to volatility, they observed that Monday has the highest volatility and Tuesday has the lowest volatility compared to Wednesday. This finding is consistent with other similar results in the Amman Stock Exchange carried out by Al-Rjoub (2004). Wong et al. (1992) investigated the day-of-the-week effect in the Malaysian stock market and reported a negative mean return on Mondays and high positive mean return on Friday.

2.2.3. Positive returns: Beginning of the week

The second group revealed that there is positive return on the first days of the week and negative on the last day of the week and the market index moves from upwards and ends downwards. Al-Loughani and Chappell (2001) used the price index of Karachi Stock Exchange (KSE) to examine the day-of-the-week effect in the KSE during the period from January 1993 to December 1997. They found that the mean daily returns are significantly different from each other and therefore a day- of- the week effect does exist on daily stock returns in the KSE. They also observed, unlike in mature Western stock market, the returns for the first day in the trading week in the KSE were found to be higher.

Angelidis and Lyroudi (2004) examined empirically the day of the week effect anomaly in the French Stock Exchange for the period 2000 to 2003. They observed the negative returns occur on Wednesdays instead of Mondays or Tuesdays as in most of the other studies during other periods. Other studies have provided evidence of the existence of negative Tuesday returns. Solnik and Bousquet (1990) examined the day of week effect for French Stock Exchange and found a strong negative return on Thursday. This finding is consistent with other similar results in Italian Stock Market (Barone, 1990) and Istanbul stock exchange (Balaban, 1995) Toronto Stock Exchange (Athanassakos and Robinson, 1994).

Aly et al., (2004) examined the day-of-the-week effect in the Egyptian Stock Market using its major stock index, the Capital Market Authority Index with a four-day trading week during the period from April 26, 1998 to June 6, 2001. They provided evidence that Monday returns in the Egyptian stock market are positive and significant on average, but are not significantly different from returns of the rest of the week.

A study conducted by Brusa et al. (2003) found the evidence of reverse weekend effect in the United States and foreign stock markets.

In Europe, s. Katerina, Demeteres, George (2002) find negative returns for Greek on Thursdays instead of Mondays or Tuesdays as it has been observed in most of the other markets

Raj and Kumari (2006) investigated the presence of the day-of-the-week effect in the Indian stock market. The effect in Indian market was examined by two major indices: Bombay Stock

Exchange Index (BSE) and National Stock Exchange Market (NSE) which covering BSE weekly data for period 1979 to 1998 and daily data for period 1987 to 1998 while NSE data was daily and weekly from 1990 to 1998. The results showed that the negative Monday. In fact, Monday's returns were higher than other days.

2.2.4. Testing for the effect: Negative results

There are a number of researchers who have found the absence of the day of the week effect. They have found there are no statistically significant differences among daily returns for all the weekdays The authors whose findings are as such include: Santemases (1986), Pena (1995) Syed and Perry (2006) and Agathee (2008). Below is a brief review of these studies.

Santemases (1986) examined the effects of the day-of-the-week effect using the daily returns of the Madrid Stock Exchange Index and the daily returns of a sample of 40 actively traded stocks from 1979 to1983. He provided no evidence for the presence of a day-of-the-week effect. Santemases concluded that there is no confirmation of pressures of the "day of the week effect" in the Spanish Stock Market. These findings are consistent with Pena (1995) findings in Spanish Stock Exchange.

Syed and Perry (2006) examined the day-of-the-week effect in 21 emerging stock markets. They provided evidence that the day-of-the-week effect is not present in the majority of emerging stock markets except Philippines, Pakistan and Taiwan.

Recently, Agathee (2008) investigated the day of the week effects in the Stock Exchange of Mauritius using data covering the market operation on a daily basis for a full calendar year to 2006. He has shown that the Friday returns appeared to be higher relative to other trading days. However, Agathee provided evidence that the mean returns across the trading days are jointly not significantly different from zero across all given years as well as for the whole sample period of 1998-2006.

2.3. MONTH OF THE YEAR EFFECT

Rozeff and Kinney (1976) were probably the first document the Month of the year effect. They found that stock returns are higher, on average, in January than in other months. Keim (1983) reports that roughly half of the annual difference between the rates of return on small and large stocks over the 1963 to 1979 period occurs during the month of January, Blume and Stambaugh (1983) adjust Keim's results for the "bid-ask spread" bias, and show that virtually all of the size effect occurs in the month of January. Roll (1983) dubs this interrelationship the "turn-of-the-year effect. Ho (1990) studied the daily returns of eight Asian Pacific stock markets between 1975 and 1987 and found a significant January effect in six of them.

More recently, Mehdian and Perry (2002) explored the US markets with a dataset covering the time period of 1964-1998. They used three different indices: Dow Jones Composite, NYSE Composite and the S&P 500. They found the January effect to be significant in all three indices in a 1964-1987 sample period. After 1987 the still positive January returns were no longer statistically significant. Tonchev and Kim (2004) examined the month-of-the-year effect in the Czech Republic, Slovakia and Slovenia from 1999 to 2003. They found weak monthly variations in the Czech markets with the returns of January and May being the highest and June returns to be the lowest. However, no evidence of month of the year effect was found in the Slovakian or Slovenian markets.

2.3.1. Empirical study findings: Month of the year

One of the most common and interesting finding of the researches carried out in the month of the year effects anomaly is the so-called January effect. It is highly argued that the returns of stocks in this particular month are far different and significant from the rest of the year's returns. This highly violates the efficient market hypothesis (EMH) theory, an idea partly developed by Eugene Fama in the late 1960s. Among the pioneering works, Wachtel (1942) documented the January effect and found that the Dow-Jones Industrial Average from 1927 to 1942 showed frequent bullish tendencies from January to December.

The first studies, by Rozeff and Kinney (1976), Dyl (1977) and Brown (1983) analyze the US stock market and observe significant higher returns in January than in the other months of the year. Also, Gultekin and Gultekin (1983) study seventeen countries using both non-parametric and parametric tests, and conclude that January returns are significantly higher when compared with the other months, in thirteen of those countries.

Reinganum (1983) investigated January effect (that is, an increase in share price in January) in Malaysian stock market. Chia-Shang, Tung Liu, Rathinasamy (2004) using markov-switching model analyzed the monthly stock returns for 1926-1992 but did not find any significant January effect. However for low capitalization small firms, very strong January effect existed. Peter Klein (2003) confirmed higher return in January for the stocks having accrued capital losses in last year. Bhardwaj and Brooks (1992) found that January effect is in fact low price effect and January returns for low price shares are lower as compared to high priced shares, after transaction cost being considered. Keim (1983) checked out the relationship of size effect and seasonality and found that around half of the difference between rates of returns (for large and small firms) takes place in month of January. Also he established that Small firm returns in January are significantly higher than the large firm returns.

A recent study conducted by Imad .A. Moosa (2007) by using monthly average returns or U.S.Stocks for period of 1970 to 2005 reveals that a significant January effect existed except for the period 1990-2005 where negative July effect dominated.

While examining Tokyo stock Exchange, Japan for January and size effects, Kato, Schallheim (1985) found that both of these effects are present there and are just similar to the U.S. Stock Market. Berges (1984) found the presence of January effect for Canadian stocks over the period 1951-1980. Balaban (1995) investigated month of the year effect in Turkey by employing percentage returns of Istanbul securities exchange composite index for 1988-93 study reported significantly high returns for three months: January, June and September. However returns of January are almost double than the compounded returns of June and September.

Mika Rossi (2007) examined calendar anomalies in stock returns for South America i-e Argentina, Brazil, Chile and Mexico for 1997 to 2006. By dividing data into two sub periods and then analyzing, it is found that Returns for the Month of January are higher in Argentina only. Nassir and Mohammad (1987) presented evidence from Malaysian stock market where the average January returns were found significantly positive and higher as compared to other months during the period 1970-1986. Another study conducted by Ho (1999), revealed significantly higher returns for month of January for six out of eight emerging Asian Pacific stock markets from 1975 to November 1987. While Examining Amman Stock exchange, Jordon, Maghayereh (2003) found no evidence of monthly seasonality as well as January effect. Pandey (2002) also found the existence of January effect for India with January not being the first-month of tax year.

All this discussion shows that the existence of month of the year effect and in most of the cases this leading month is January.

2.4. EXPLANATIONS FOR THE EFFECTS

Two hypotheses have been formulated by many researchers in trying to explain the day of the week anomaly:

2.4.1. The Calendar Time Hypothesis

According to this hypothesis, the return generating process is continuous. This means that Monday's average return will be different than the other days' average returns. The reason for this is that Monday's average return is estimated from the closing price on Friday until the closing price on Monday. Hence, Monday's average return will be three times higher than the average returns of the other working days (French, 1980; Lakonishok & Levi, 1982).

2.4.2. Trading behaviour

Lakonishok and Maberly (1990), Sias and Starks (1995) and Kamara (1995) document that trading behaviour, especially selling activity, tends to increase trading activity on Mondays. Sias and Starks (1995) report that the weekend effect returns and volume patterns are more pronounced in securities in which institutional investors play a great role. Kamara (1995) assumes that increased institutional trading activity is responsible for the Monday seasonal returns. Wang, Li and Erickson (1997) report that the day-of-the-week effect occurs primarily in the last two weeks (fourth and fifth weeks) of the month.

Draper and Paudyal (2002) report for UK that Monday effect is caused by a combination of various factors, especially the fortnight of the month, account settlement day, ex dividend day, arrival of (bad) news on Fridays, trading activity and bid-ask spread.

Month of the Year Effect

There are a number of reasons proposed to explain the month of the year effect. These reasons include:

2.4.3. Tax Loss Selling Hypothesis

This hypothesis was first suggested by Branch (1977). According to it, investors, wanting to realize capital losses in current tax year, scramble for stocks that that have previously experienced negative return. In so doing, the investors create a downward price pressure at the yearend December) on securities. Subsequently, the same investors repurchase the same securities at the beginning of the new tax year (January. They create inflated levels of demand which in turn causes selling pressure. This selling pressure is relieved and the affected securities earn excess return as their prices rebound.

Several authors carried more advanced studies on the tax loss hypothesis in order to investigate who the most probable firms and securities that participate in tax loss selling would be. Brauer & Chang (1990) suggests that small firms' stock returns are more volatile than large firms' returns, small-firm stocks are more likely to have generated usable tax losses and therefore be candidates for tax loss selling. Evidence in support of this hypothesis is provided by Jones, Lee and Apenbrink (1991); Poterba and Weisbenner (2001); Chen and Singal (2001); Dai (2003).

However, contradicting evidences are also abundant. Brown et. al (1983) in Australia and Kato and Schallheim (1985) in Japan report significant January effects, even though January is not the beginning of the tax year in the countries of study. Van den Bergh and Wessels (1985) demonstrate that the January effect obtains in markets without capital gains taxes, and Jones, Pearce, and Wilson (1987) report that the January effect obtains even before the imposition of income taxes in the United States. Similar to the United States, Berges, McConnell, and Schlarbaum (1984) study the Canadian stocks where December is the tax year-end. They find a January seasonal prior to 1972 when Canada had no capital gains tax. One explanation they offer for the existence of a January effect in countries without December-end tax year is that foreign investors induce a January seasonal in those countries. If investors from countries with a December-end tax year have significant equity holdings in foreign countries then the January seasonal would be observed due to trading by those investors

2.4.4. Window Dressing Hypothesis

According to the window-dressing hypothesis, developed by Haugen and Lakonishok (1988), institutional managers are evaluated based on their performance and their investment philosophy. To improve their performance, the institutions buy both risky stocks and small stocks but sell them before the end of the year so that they do not show up in their year-end holdings.

This hypothesis has been supported by Meier and Schaumburg (2004).

Sias and Starks (1997) find two main motivations to engage in window dressing. First, window-dressing may successfully allure some investors, especially those who are not well investment-educated and who are not aware of the potential existence of window-dressing. Such investors could be influenced by the disclosure of a mutual fund's top 5 or 10 holdings, which could reflect in part the results of window-dressing activity. Second, poorly performing managers could benefit from window-dressing as a result of reporting requirements. In the region of study for this paper, fund managers may file their disclosure reports up to 60 days following the end of a quarter. If the manager of a poorly performing fund *'window dresses'* and fund performance improves during the delay period, it may make it difficult for investors to discern if this manager has engaged in window-dressing or is exhibiting stock selection skill. Thus, a fund manager, especially one facing career concerns due to poor prior performance, may view window-dressing as a rational activity.

While investigating January effect for polish stock exchange, Henke (2003) also established that since no taxes are levied on capital gains, tax loss selling hypothesis is out of questions and window dressing activity by institutional investors is the only reason for increase in trading volume of continuous trading system during December and January

Because many of the predictions of the window dressing and tax-loss selling hypotheses are the same, it is difficult to determine which explanation, if either, drives the January effect. For instance, Sias and Starks (1997) and Poterba and Weisbenner (2001) both design controlled tests to disentangle and separately evaluate the two hypotheses in the equity market, and both of these studies find evidence that is more consistent with the tax-loss selling hypothesis However, the inability to distinguish institutional trades from individual trades or to distinguish tax-motivated trades from other trades makes their results suggestive but incomplete

2.4.5. Measurement

In order to check out the existence of anomalies, stock indices are used because index truly represents the traits and performance of overall market and anomalies are more easily detected in indexes as compared to individual shares (Pandey, 2002).

Previous studies of stock market anomalies may in general be divided into four groups based on the methodology employed. The first group of studies calculate returns means and variances for each day (month) of the week (year) and estimate a simple OLS regression with dummies using standard t or F tests to check the significance and equality of mean returns, without paying attention to the time series properties of the sample data (French 1980). Whereas this may give an indication of the presence or otherwise of some specific anomalies, the data generation process and misspecification effects could cast doubt on the reliability of the results reported in such studies.

The second group of studies as reported in Gibbons and Hess (1981) also report mean daily (monthly) returns based on OLS regressions, however, hypothesis tests are carried out using *t*-statistics and χ 2 calculated using heteroscedasticity-consistent standard errors. This group does not however, examine the distributional properties of the data used.

In the third group, normality of returns is tested for by means of Kolmogorov-Smirnov D statistic. If the returns are found to be normally distributed, then *t* and *F*-tests are employed. Otherwise nonparametric tests are used to tests the existence of anomalies.

The last group of studies starts by reporting descriptive statistics of the distributional properties of the return series. If these statistics indicate that the series are highly leptokurtic relative to normal distribution, the outcome provides a justification for the use of GARCH model to investigate the presence of anomalies.

2.5. CONCEPTUAL FRAMEWORK

The framework of analysing returns is largely borrowed from French (1980) Lakonishok, Smidt (1988) and Pandey (2002) . In all of these studies, the variables to be used were divided into two categories: First is the independent variable namely be the stock prices at different periods. In the case of the 'day-of-the-week effect, the time period (t) would refer to a particular day from a five day stock trading week. In the 'month-of-the-year' effect, the time period (t) would be a particular month from a twelve month calendar. Subsequently, the dependent variable is the return on the stocks. This may be daily returns or monthly returns. The log returns will be computed as below:

$$R_t = \log\left(\frac{P_t}{P_{t-1}}\right) \times 100 \quad \text{.......} (1)$$

Where R_t is the compounded rate of return of the index at time (t) and P_t is the level of the index at time (t).

The standard methodology employed in investigating seasonality in returns entails estimating an Ordinary Least Squares (OLS) regression with dummies to capture the calendar effects as

$$R_t = \propto_1 M_{1t} + \propto_2 M_{2t} + \ldots\ldots \propto_{12} M_{12t} + \varepsilon_t \quad \text{.......} (2)$$

R_t is the continuously compounded index return on period t as shown in (1).

M_{xt} are dummy variables such that $M_{1t} = 1$ if month (t) is January or day (t) is Monday and zero otherwise; $M_{2t} = 1$ if month t is February or day (t) is Tuesday and zero if otherwise and so forth. The OLS coefficients $\propto_1$ to $\propto_{12}$ are the mean returns for January (Monday) through December (Friday) respectively and ε_t is the stochastic term. The presence of seasonality implies

$H_0: \propto_1 = \propto_2 \ldots\ldots \propto_{12} = 0$ against $H_1: \propto_1 \neq \propto_2 \ldots\ldots \propto_{12} \neq 0$ ....(3)

If the null hypothesis is rejected then stock returns must exhibit some form of monthly seasonality. In order to find out the seasonal pattern, each return observation is coded as day.

Previous studies examined the month of the year effect in various markets in the context of equation (2) using standard t and F-test without paying attention to the time series properties of the data. This may result in a major problem: The error term in the model may be autocorrelated resulting in misleading inferences. The can be resolved by including autoregressive terms in (2).

2.6. MODEL SPECIFICATION

In order to test whether seasonalities exist in the returns, both calendar anomalies are studied separately using the ordinary least squares (OLS) regression with dummy variables. It is suggested by Brooks (2004, 537) as a simple way of detecting seasonalities in stock returns. The objective is to test whether daily (or monthly) returns are statistically different from each other. For detecting a possible day of the week effect, the following regression model is constructed:

$$R_t = \gamma_0 + \sum_{1}^{4} \gamma_i D_{it} + \varepsilon_t$$

Where R_t is the return on day t for each country's index examined separately, D_{it} is dummy variable taking value of one for the returns which occur on day i, and zero otherwise, γ_0 is the intercept which measures the mean returns for Monday, and the coefficients from γ_1 to γ_4 measure the difference between the mean return of Monday and other days of the week, and ε_t is the random error term.

The model is tested for the null hypothesis of

$$H_0: \gamma_i = 0 \; for \; i = 1 \; .... 4$$

against the alternative hypothesis that all days of the week are not equal. In case there is no day-of-the-week effect, the coefficients for dummy variables are not significantly different from zero meaning that the return on day i is not different from Monday's return. Hypothesis is evaluated using the F-test.

Similarly, the following model is used for the month-of-the-year effect:

$$R_t = \gamma_0 + \sum_{11}^{11} \gamma_i D_{it} + \varepsilon_t$$

where R_t is the return on month t for each country's index examined separately, D_{it} is dummy variable taking value of one for the returns which occur on month i, and zero otherwise, γ_0 is the intercept which measures the mean returns for January, and the coefficients from $\gamma 1$ to γ 11 measure the difference between the mean return of January and other months of the year, and t. ε is the random error term.

The model is tested for the null hypothesis

$H_0: \gamma_i = 0 \; for \; i = 1 \; .... 11$

against the alternative hypothesis that all months are not equal. If there is no month of- the-year effect, the coefficients for dummy variables are not significantly different from zero meaning that the return on month i is not different from January's return. The F-test is employed for testing the hypothesis. Brooks (2004, 55-56) introduces the assumptions behind the linear regression model: variance of the error terms must be constant, the error terms are statistically independent and are uncorrelated and the error term follow the normal distribution. To test the series for autocorrelation, the Durbin-Watson (D-W) statistic is used. When the DW-statistic is equal to the value of two there is no autocorrelation in the residuals. When is has a value of zero, there is perfect positive autocorrelation in the residuals and a statistic of four corresponds to the case where there is perfect negative autocorrelation. The DW does not follow a standard statistical distribution but there are critical values based on number of observations and explanatory variables excluding the constant. In this case as an approximate, we don't reject the null hypothesis of no autocorrelation unless the DW is outside a 1.5-2.5 boundary. (Brooks 2004, 160, 163-164)

For detecting of heteroscedasticity (variance of the error terms is not constant), the White's heteroscedasticity test will be used.

For the individual stocks, the following model will be employed:

$$R_t = \beta_1 D_{1t} + \beta_2 D_{2t} + \beta_3 D_{3t} + \beta_4 D_{4t} + \beta_5 D_{5t} + \beta_6 R_{t-1} + \varepsilon_t$$

R_t is the index return in period t, ε_t is the error term, D_{1t} is the dummy variable for Mondays if the observation falls on a Monday and 0 if it falls on any other day. In order to deal with autocorrelation, a lag variable is introduced represented by R_{t-1}

The null hypothesis which indicates that there is no calendar effect can be tested by proving that:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5$$

2.7. SUMMARY OF LITERATURE AND CONCEPTS

It is apparent that the findings from studies that test presence or absence of calendar effects is widely varied. Different authors have arrived at different results in a varied number of countries. What is unique about this particular study is that it tests for calendar anomalies in both the index and individual stocks as well. Most previous literature has been based on a premise that should a day of the week effect exist, it would most likely be experienced on a Friday or on a Monday; hence the Friday and Monday effects. This study was *atheoretical* in the sense that it was *a priori*. The evidence spoke for itself without the need of a hypothesis of an effect to be experienced at a particular time period. However, the concepts, formulae and models used have all been tested in prior studies. The chapters that follow show the process employed and the results of this discourse.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. INTRODUCTION

This section describes what data was used to achieve the research objectives, the methods used to analyse it and thereafter make inferences. It is also defines the notation, constructs and thresholds the tests will utilise to establish the presence and absence of calendar specific anomalies.

3.2. RESEARCH DESIGN

Descriptive analysis was used to carry out this study. The focus of this study was to provide information on the presence or absence of the calendar effect in the NSE. No inquiry as to why the presence or the absence of the anomalies occurs was conducted. Regression analysis was employed and a variety of descriptive statistics and statistical tests were used to arrive at a conclusion.

To achieve the first objective, the patterns of returns for the NSE 20 index will be established and the monthly or daily returns of the index will be compared against similar calendar points in other periods. The returns will be checked for statistical significance in similarity.

For the second objective, the daily returns for all the 13 years under study were computed for each of the stocks in the NSE. Using the regression model with dummy variables, each of the stocks were checked for day of the week and month of the year effects.

3.3. POPULATION AND SAMPLING

The population for this study was the companies listed on the Nairobi Securities Exchange between January 3rd 2001 and December 31st 2013. There were two samples used in undertaking this study.

The first sample was the NSE 20 share index for the period under consideration. That sample was used to best satisfy the first objective of establishing whether there is a caledar effect in the NSE 20 index. This choice of the NSE 20 share index is mainly due to the investor-attractive qualities that these NSE companies posses: The NSE 20 share Index measures the performance of 20 blue-chip companies with strong fundamentals and which have consistently returned positive financial results. The NSE 20 index is a price weighted index. The members are selected based on a weighted market performance for a 12 month period as follows: Market Capitalization 40%, Shares Traded 30%, Number of deals 20%, and Turnover 10%.

Ideally, these companies should be the most attractive to investors and much of the trading activity will be focused on this set of companies.

In order to best answer the second research question and achieve the second objective, the sample chosen was any stock listed on the NSE that had traded for at least 180 continuous trading days in a calendar year. The composition of the NSE 20 index has changed over time and a different set of companies will be used every year.

The period of investigation chosen (2001 to 2013) is due to the fact that the earliest stock data Nairobi Stock Exchange avails for sale is stock prices as from 2nd January 2001. December 31st is the latest date

3.4. DATA COLLECTION METHODS

The data to be used in this study will be the daily share prices of the sample between the years of 2001 and 2013. The data was obtained from one of data vendors approved by the NSE.

3.5. DATA ANALYSIS

In order to establish the presence or absence of stock return seasonality, the first step of the analysis was to carry out some statistical tests that would establish the suitability of the data to the methods of analysis proposed. The two preliminary tests carried out were the *White's test* for heteroskedasticity and the *Jacque Bera* test for normality. The threshold for the Whites test is a p-value of the R^2 greater than 0.05 to guarantee that the data is suitable. The *Jacque Bera* test requires that the p-value or the residuals to be of a value of zero to prove normality. Once the data was proven to be heteroskedastic and normal, it was suitable for use in an OLS regression.

After completing the diagnostic tests, the regressions were run in two major sets- on set of regressions were to test the calendar effects in the NSE 20 index and the second set of regressions tested the calendar effects in the individual stocks. will to run a regression model of month and day returns against returns for similar points at different time periods. The returns for days of the week for example, will be tested for statistical significance against similar days of the week in other weeks across the years of 2000 to 2013. The returns of various months will be checked against the returns of other months for the same period of 2000 to 2013. This method is identical to the one employed, among others, by *Gibbons and Hess* (1981), *Jaffe and Westerfield* (1985), *Krämer and Runde* (1993), and *Bayar and Kan* (2002). These authors all used the Ordinary Least Squares (OLS) method in establishing a linear relationship.

Although it is widely accepted that the OLS approach suffers from certain methodological drawbacks in the presence of autocorrelation, excess kurtosis, and heteroscedasticity (*Wilson and Jones*, 1993; *Kiymaz and Berument*, 2003), this approach will be employed for the sake of comparability with prior studies, since most of previous studies report solely OLS regression results.

The regression model employed for the day of the week will be as follows:

$$R_t = \alpha_1 MON + \alpha_2 TUE + \alpha_3 WED + \alpha_4 THU + \alpha_5 FRI + e_t$$

Where R_t is the respective trading day's index return. *MON, TUE, WED, THU,* and *FRI* are binary dummy variables, taking the value "1" for the respective day of the week, and "0" otherwise. E_t is a serially independent disturbance term. Thus, each weekday *t*'s return is modelled as a function of only one linear variable α_n, plus a stochastic residual e_t.

As a result, the regression produces the mean returns of each day of the week. To test for the hypothesis that mean returns are not equally distributed across days of the week, F-statistics are computed for each of the regressions. Moreover, t-statistics indicate the level of significance of each mean return calculated.

The process above will be replicated to establish the month of the year effect using the model:

$$R_t = \alpha_1 M_{1t} + \alpha_2 M_{2t} + \ldots\ldots \alpha_{12} M_{12t} + \varepsilon_t$$

M_{nt} are dummy variables such that $M_{1t} = 1$ if month (t) is January and zero otherwise; $M_{2t} = 1$ if month t is February and zero if otherwise and so forth. The OLS coefficients α_1 to α_{12} are the mean returns for January through December respectively and ε_t is the stochastic term. The presence of seasonality implies

$H_0: \alpha_1 = \alpha_2 \ldots\ldots \alpha_{12} = 0$ against $H_1: \alpha_1 \neq \alpha_2 \ldots\ldots \alpha_{12} \neq 0$ ....(3)

If the null hypothesis is rejected then stock returns must exhibit some form of monthly seasonality.

3.6. SUMMARY OF METHODOLOGY

The time period for study of the calendar effects was 13 years beginning 2nd January 2001 to 31st December 2013 and the population under investigation is the Nairobi Securities Exchange (NSE). The basic concept underlying the methodology employed was that the calendar anomalies could be evident at two levels. The first level was the NSE 20 index which by and large bears characteristics of the securities exchange. The two calendar effects was tested in the index and even more keenly divided into several sub periods to check for development, static, nonexistent or diminished effects. After this was complete, the same calendar effects were tested in specific stocks that formed a larger sample base and it was then possible to identify the presence or absence of the calendar effects in specific stocks for the period under consideration.

CHAPTER FOUR: PRESENTATION OF RESEARCH FINDINGS

4.1. INTRODUCTION

This chapter describes the results of the applied methodology as described in the preceding chapter. It starts off with a description of the diagnostic tests undertaken to determine suitability of the data followed by details of the results of the regression analysis in the data. In order to satisfy the objectives set out in chapter one, it describes the findings with regard to the calendar effect test in the NSE20 index and the individual stocks in the NSE.

The section (4.2) describes the diagnostic tests, their importance, the results obtained with regards to this study and the implications of the results on this research paper. The part (4.3) discusses the findings arrived at when investigating the day of the week and month of the year effect in the NSE 20 index. Section (4.4) details the extent of the day of the week and month of the year effects in individual stocks. The chapter concludes with a summary of the general deductions that can be derived from the findings obtained in part (4.3) and (4.4)

4.2. DIAGNOSTIC TESTS

4.2.1. Relevance and application of diagnostic tests in this study

The use of an OLS regression analysis to establish calendar effects presumes that the data being used meets the minimum requirements. These requirements include the main assumptions that that the data are normally distributed, serial uncorrelated and with constant variance (Wooldridge, 2003). The first test that is carried out is a test of homoskedasticity. If the returns for the NSE20 index are found to have a constant variance, a state known as homoskedasticity is proved to be found. The OLS regression seeks to minimize residuals and in turn produce the smallest possible standard errors. Engle (1982) explains that OLS regressions give equal weight to all observations, but when heteroskedasticity (which is the absence of homoskedasticity) is present the cases with larger disturbances have more "pull" than other observations. The coefficients from OLS regression where heteroscedasticity is present are therefore inefficient but remain unbiased. In this case, weighted least squares regression would be more appropriate, as it downweights those observations with larger disturbances.

Woolridge (2003) also suggests that the error terms should be normally distributed in order to allow us to make exact inferences. In this paper, normality of the error terms is tested using a histogram of the error terms.

Should the tests for homoskedisticty and normality turn out to be positive (showing the presence of homoskedasticity and normality), it would allow for the use of OLS regression.

4.2.2. Heteroskedasticity

OLS estimates are consistent in the presence of heteroskedasticity, but the standard errors are no longer valid. In order to test for heteroskedasticity, the White test is used. White Test is a test for heteroskedasticity in OLS residuals.

In this particular case, The null hypothesis H_o is that the variance of the disturbance term is homoskedastic and the alternative hypothesis is H_1: the variance of the disturbance term is heteroskedastic of an unknown form.

The test statistic was computed by an auxiliary regression of the squared residuals on all possible products of the regressors. The number of observations times the R^2 from the test regression is used to compute the White Test statistic.

Heteroskedasticity implies that the variance terms $\hat{\varepsilon}_i^2$ is related to the regressors in some way. In the case of this study, $\hat{\varepsilon}_i^2$ refers to the error terms and the regressors are the daily returns of the NSE20 index.

The testing process involved the use of a χ_h^2 test (where *h* refers to the degrees of freedom and *h= k-1* from the auxiliary equation (in this case *h=6-1=5*). The critical values for the test were obtained by using the χ^2 tables. The test was done at the 5% significant level with *h*=5, five degrees of freedom, would imply a test statistic of $\chi_h^2 = \chi_{5;5\%}^2 = 11.07$

With the test critical value available the next to be computed was the χ^2 test statistic and this was does by the expression: NR^2 from the auxiliary equation (where *N*= the number of observations). In the case of this study, the value of *N*=2746 observations and an $R^2 = 0.00252$ was obtained. Subsequently, the test statistics would be $x^2 = 6.9416$

The White test dictates that if $\chi^2_{(\text{test statistics})} > \chi^2_{5;5\% (\text{critical value})}$ we reject the null hypothesis of homoskedasticity. In this case, $X^2_{(test\ statistic)} = 6.9416\ and\ X^2_{5;5(critical\ value)} = 11.07$

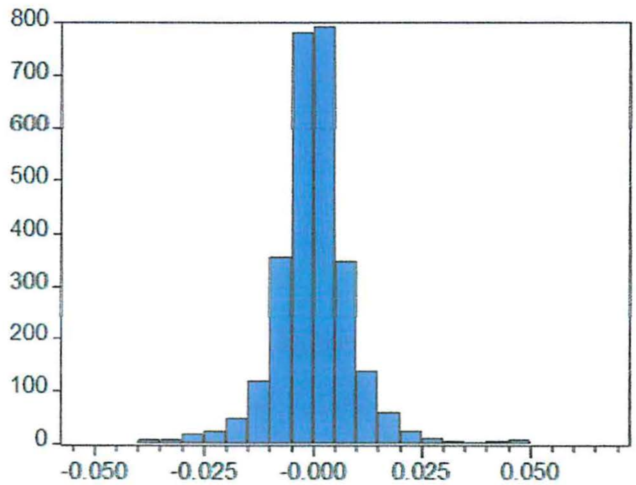
If $\chi^2_{\text{test statistics}} < \chi^2_{5;5\% \text{ (critical value)}}$ we do not reject the null hypothesis of homoskedasticity and we can proceed to use OLS as a regression method. As a result of the results obtained above, the null hypothesis cannot be rejected and OLS thus becomes a valid method of regression.

As seen from table below, the probability of the observed R^2 shows that the null hypothesis cannot be disproved. Subsequently, it would be reasonable to conclude that the time series can be used for OLS estimation.

4.2.3. Distribution of returns

The NSE 20 index returns were for this purpose show normality but with clear leptokurtic tendencies. As described in table 2 below, kurtosis of 10.79070 indicates a significantly 'peaked' mean that may be an indication of extreme values that the NSE 20 index has undergone throughout its 11 years as studied. This leptokurtic distribution points to non-normality. Additionally, the slightly positive skewness of the index returns points to a position that is subtly tending towards normality. Further to this, the positive skewness is likely to be an indicator of a series of returns that is made up of many small values and few large values. This further compliments the high kurtosis that seems to suggest that it is likely that extremely high or low returns were few but of such great magnitude. Prior studies also confirm this as a dominant trait of stock market returns when described as time series data.

Table 4.1 Distribution of returns



Series: RETURNS	
Sample 1 2747	
Observations 2747	
Mean	0.000197
Median	0.000000
Maximum	0.069476
Minimum	-0.052339
Std. Dev.	0.009087
Skewness	0.656479
Kurtosis	10.79070
Jarque-Bera	7144.351
Probability	0.000000

The ultimate test of normality is the Jarque Bera test with a value of 7144.351. This, coupled with a p-value of 0.05 indicates that the null hypothesis can be rejected. In summary, the hypothesis that the distribution exhibits normality is accepted.

Conclusions from diagnostic tests

4.3. CALENDAR EFFECT IN THE NSE 20 INDEX

4.3.1. Day of the week effect

The day-of-the week effect was tested in the mean and volatility of returns. In other words, how likely is one to see varied returns of the NSE 20 and how likely it is to experience high volatility within days of the week. As a result, the findings are grouped according to the calendar effect in i) returns and ii) volatility

4.3.2. The day of the week effect in the mean

The returns between the various days of the week for the period between 2001 and 2011 vary as shown by the values represented in the second row on Table 3. On average the highest return is observed on Friday. However, these returns are not significantly different from those observed on Monday. This significance is represented by a p-value less than 0.05 which means the null hypothesis (that the returns are statistically different from those observed on Monday) can be rejected.

This difference in returns is significant for Monday, Tuesday, Wednesday and Thursday. The returns prove that there indeed is a 'Monday Effect' with the returns on Monday being the highest of the week and statistically significant.

Table 4.3.1: The day of the week effect in the mean

MEASURE	α_1	α_2	α_3	α_4	α_5	WALD
NSE 20 INDEX VALUE	0.000387	-0.00045	-0.00045	-0.00044	0.000539	2.1311
p − values	0.03347	0.0456	0.0368	0.0486	0.0154	0.0386

4.3.3. The day of the week effect in volatility

All days of the week seem to exhibit the same level of volatility. Tuesday and Wednesday show slightly higher than the rest of the days but with little change in volatility. This similarity in volatility means that no trading day is likely to bear more risk than any of the other days.

Table 4.3.2: The day of the week effect in volatility

MEASURE	α	β	γ	$\hat{\delta}_2$	$\hat{\delta}_3$	$\hat{\delta}_4$	$\hat{\delta}_5$	WALD
NSE 20 INDEX VALUE	0.00008	0.00005	0.00069	0.00009	0.00009	0.00008	0.00008	2.2696
p − values	0.7741	0.0003	0.0001	0.3722	0.6175	0.3287	0.2559	0.0472

4.3.4. The month of the year effect in returns

The highest returns are observed in January and December with the lowest returns observed in February, March and August. All the returns are significantly different from each other as they are below the threshold p-value of 0.05

Table 4.3.3: Month of the Year Effect in the mean

MEASURE	NSE 20 INDEX	ρ − values
β_1	0.017337	0.04493
β_2	-0.04362	0.03354
β_3	-0.03117	0.05990
β_4	0.00239	0.02862
β_5	-0.00905	0.04062
β_6	0.001557	0.03301
β_7	-0.02062	0.04778
β_8	-0.03569	0.01501
β_9	-0.02524	0.02101
β_{10}	0.006896	0.02768
β_{11}	-0.01698	0.04859
β_{12}	0.010733	0.01185
WALD	2.2539	0.0103

4.3.5. The month of the year effect in the mean

January and December display the highest volatility. These months are also coupled by May and June which also exhibit high volatility. With the exception of March, all the other months seem significantly different from January's volatility. The results of the testing of this effect are tabulated in Table 4 below.

Table 4.3.4: The Month of the year effect in volatility

MEASURE	NSE 20 INDEX	ρ − values
α	0.924338	0.2299
β	0.145492	0.0060
γ	0.146377	0.0022
$\hat{\delta}_2$	0.335974	0.0277
$\hat{\delta}_3$	0.559652	0.0601
$\hat{\delta}_4$	0.545729	0.03273
$\hat{\delta}_5$	0.881162	0.04334
$\hat{\delta}_6$	0.771287	0.01371
$\hat{\delta}_7$	0.555590	0.03161
$\hat{\delta}_8$	0.361707	0.01462
$\hat{\delta}_9$	0.628682	0.02927
$\hat{\delta}_{10}$	0.241313	0.01907
$\hat{\delta}_{11}$	0.035278	0.05089
$\hat{\delta}_{12}$	0.856184	0.02314
WALD	2.2005	0.01747

4.4. DEVELOPMENT OF THE EFFECT

To enable clearer analysis, the period of study was further split into two sub-periods with the pivot point being September 2006. This is the month in which the NSE implemented the In live trading on the automated trading systems. As a result, it gave greater access to the trends in prices of stocks and a larger percentage of the public is likely to have gained access to information that was previously private information. The aim of using this pivot point was simply one of arbitrary choice. It was not the researcher's intention to carry out an event analysis but rather to check a stochastic process that is; the seasonality of returns.

4.4.1. Day of the week effect development

Based on the results as shown in Table 5 below, the day of the week effect has showed greater effects in the years between 2001 and 2006. The effect is not as strong in the years 2006 to 2013. Additionally, the difference in returns between Tuesday, Wednesday and the rest of the days is not as significant as it was for the same days between 2006 and 2013.

However, Monday still retained the highest returns; Tuesday and Wednesday still exhibiting the lowest returns.

Table 4.4.1: Trends in day of the week effect: The mean

MEASURE	α_1	α_2	α_3	α_4	α_5	WALD
NSE 20 (2001 – 2011)	0.000387	(0.00045)	(0.00045)	(0.00044)	0.000539	2.1311
p – values	0.03347	0.06456	0.08687	0.08866	0.0154	0.0861
NSE 20 (2001 – 2006)	0.000826	(0.00065)	(0.00163)	(0.00085)	0.00095	2.004
p – values	0.0858	0.0723	0.0305	0.9659	0.1544	0.065
NSE 20 (2006 – 2011)	0.00052	(0.00117)	(0.00111)	(0.00005)	0.00027	2.003
p – values	0.08935	0.0634	0.0667	0.08809	0.0501	0.00932

4.4.2. Day of the week effect development: volatility

Similar to the day of the week effect in returns, volatility is seen to be greater in the years between 2006 than it is for the years between 2006 and 2011.

Wednesday and Thursday are still the days that experience the most volatility out of all the days of the week.

All levels of volatility are significantly different from each other as shown by the p-values that are less than 0.05.

Table 4.4.2: The day of the week effect in volatility

MEASURE	A	β	γ	δ_2	δ_3	δ_4	δ_5	WALD
NSE 20 (2001 – 2013)	0.0008	0.0005	(0.0069)	0.0009	0.0009	0.0008	0.0008	2.2696
p – values	0.07741	0.500	0.600	0.0037	0.0061	0.032	0.0255	0.0472
NSE 20 (2001 – 2006)	0.00045	0.00074	(0.00847)	0.0038	0.0022	0.0058	0.0013	2.473
p – values	0.04969	0.4043	0.667	0.564	0.0389	0.3403	0.0383	0.685
NSE 20 (2006 – 2013)	0.00017	0.00089	0.9812	0.000367	0.0036	0.00073	0.000362	2.364
p – values	0.0504		0.8575	0.0209	0.02908	0.0456	0.251	0.217

4.4.3. Development of the effect: month of the year returns

The sub-period month of the year returns show seasonality in a pattern similar to those of the entire period. Also in a manner similar to the day of the week, the effects are stronger in the first sub-period (2001 to 2006) than they are for the period of 2001 to 2013. January and December still exhibit the highest returns.

However, the effect appears to diminish in the period 2006 to 2013. Although the returns are different from each other, their p-values are below the 0.05 threshold. This indicates that the difference in returns may not be significant after all.

Table 4.4.3: Development of month of the year effect in volatility

MEASURE	NSE 20 (2001 – 2013)	p – values	NSE 20 (2001-2013)	p – values	NSE 20 (2006 – 2013)	p – values
β_1	0.017337	0.04493	0.050774	0.0243	0.01279	0.4008
β_2	-0.04362	0.03354	-0.057063	0.5416	-0.02537	0.0001
β_3	-0.03117	0.05990	-0.04506	0.1046	-0.02364	0.0002
β_4	0.00239	0.02862	0.009046	0.7710	0.001544	0.1721
β_5	-0.00905	0.05062	-0.016465	0.5802	-0.00152	0.0000
β_6	0.001557	0.03301	0.012029	0.6587	0.001013	0.0001
β_7	-0.02062	0.07768	-0.0519	0.6277	-0.01346	0.0001
β_8	-0.03569	0.01501	-0.01738	0.2704	-0.02846	0.0992
β_9	-0.02524	0.07101	-0.01784	0.9619	-0.03098	0.0000
β_{10}	0.006896	0.02768	0.049383	0.0002	0.003276	0.0003
β_{11}	-0.01698	0.05859	0.033285	0.1698	-0.02708	0.0052
β_{12}	0.010733	0.01185	0.027301	0.4849	0.028712	0.1653
WALD	2.2539	0.0103	2.0039	0.0402	2.0139	0.0196

4.4.4. Development of month of the year effect in volatility

Unlike the other effects previously shown, the development of the month of the year effect shows greater volatility in the second sub-period compared to the first sub-period. January and December together with May and June exhibit the greatest volatility. November shows the lowest volatility for both sub periods.

Table 4.4.4: Development of month of the year effect in volatility

MEASURE	NSE 20 (2001-2011)	p − values	NSE 20 (2001-2006)	p − values	NSE 20 (2006-2011)	p − values
α	0.924338	0.2299	0.816956	0.0366	0.975646	0.4008
β	0.145492	0.0060	0.108503	0.3300	0.499675	0.0000
γ	0.146377	0.0022	0.696462	0.0459	0.025290	0.0064
$\hat{\delta}_2$	0.335974	0.0277	0.277419	0.6579	0.365260	0.0000
$\hat{\delta}_3$	0.559652	0.0601	0.528720	0.0147	0.855851	0.0000
$\hat{\delta}_4$	0.545729	0.3273	0.316648	0.8979	0.667691	0.1721
$\hat{\delta}_5$	0.881162	0.9334	0.642267	0.9354	0.935560	0.0000
$\hat{\delta}_6$	0.771287	0.1371	0.646343	0.3544	0.954106	0.0000
$\hat{\delta}_7$	0.555590	0.7161	0.447567	0.8066	0.650302	0.0000
$\hat{\delta}_8$	0.361707	0.1462	0.281787	0.0571	0.479363	0.0992
$\hat{\delta}_9$	0.628682	0.7927	0.568132	0.7271	0.691047	0.0000
$\hat{\delta}_{10}$	0.241313	0.0907	0.988893	0.0002	1.956043	0.0003
$\hat{\delta}_{11}$	0.035278	0.5089	0.742401	0.1504	0.500303	0.0052
$\hat{\delta}_{12}$	0.856184	0.2314	1.029346	0.4486	0.321235	0.1653
WALD	2.2005	0.0174	1.9856	0.0456	2.390	0.0734

4.5. CALENDAR EFFECT IN STOCK RETURNS

4.5.1. Introduction

In order to achieve the second objective of this research thesis, the NSE stocks needed to be individually investigated for the calendar effect. First, the daily and monthly stock log returns were ordered for the 13 years under consideration. Time series data and stock price returns have been found to be susceptible to auto correlation since the current day's prices are greatly influenced by the previous day's prices. To eliminate this issue of autocorrelation, a lag variable is introduced in the regression analysis. Each individual stock's return was regressed a series of dummy variables and one lag variable (representing the previous day's return).

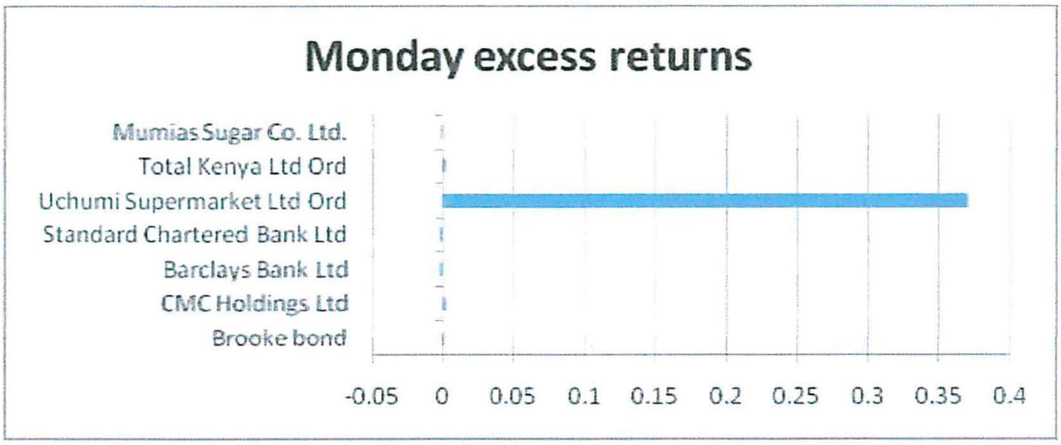
For the purposes of establishing a reliable position, only stocks that had traded for an equivalent of 180 trading days or more in a year were included.

The section below represents the findings of the regression analysis.

4.5.2. Monday returns

The average returns on Monday show that minimal changes took place on Mondays for the period covering 2001 to 2013. The highest significant change with a t-test probability value of 0.05 and below is Uchumi Supermarkets limited with an average increase of 36% on Mondays. The other stocks that exhibited any statistically significant change on Mondays included negative changes; meaning on average the Monday return dipped- ranging from -1.3% to -2.6% for the stocks of Mumias Sugar Company, Standard Chartered Bank and Barclays Bank Ltd. The graph below summarises the statistically different returns on a Monday for the period between January 2001 and December 2013.

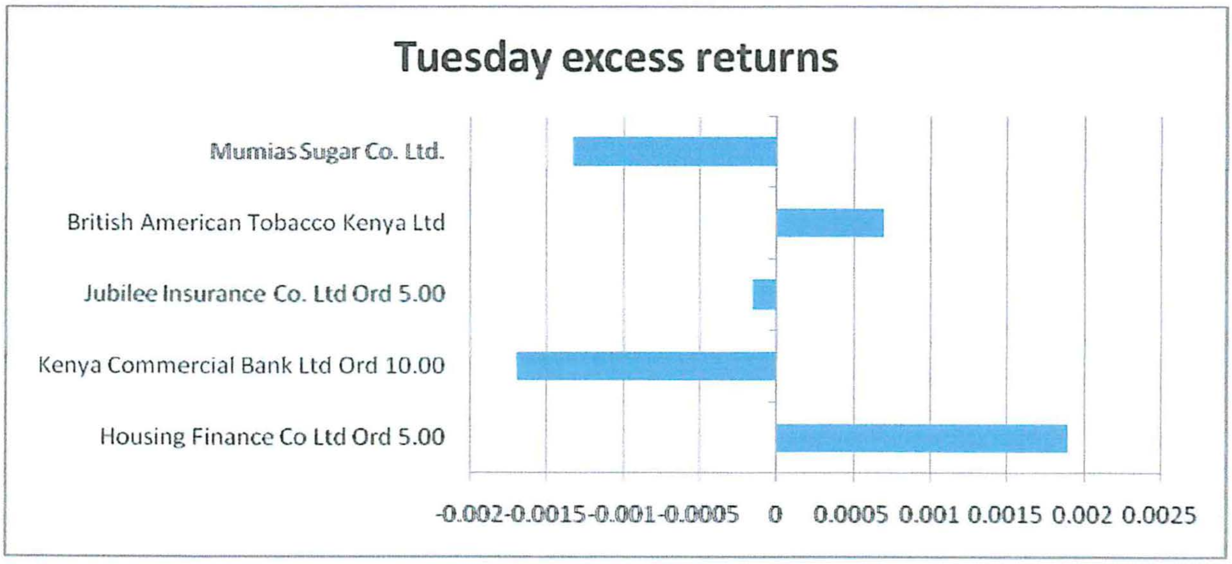
Graph 4.5.1: Monday returns for individual stocks



4.5.3. Tuesday Returns

The average Tuesday returns showed a mixed but highly statistically significant set of returns. These included positive results for British American Tobacco stocks and Housing Finance Ltd stocks. Those that exhibited negative results included Jubilee Insurance Ltd and Kenya Commercial bank. Mumias Sugar Limited also continued its slight dip in returns exhibited on Mondays. The table below summarises the returns obtained.

Graph 4.5.2: Tuesday returns for individual stocks

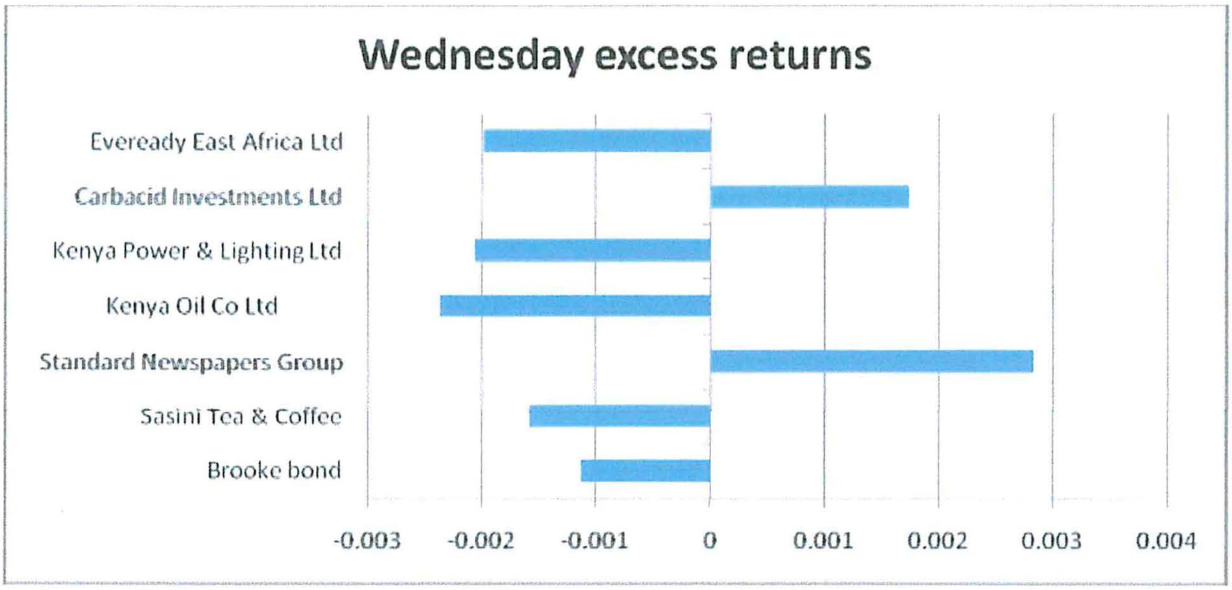


4.5.4. Wednesday Returns

The Wednesday returns show a definite and larger set of increases and decreases in return. It would appear that the half-hearted changes experienced on Mondays and Tuesdays was not the case when it came to Wednesday returns.

The stocks that showed a marked positive increase in returns included Carbacid and The Standard Group. The majority of changes were negative decreases in returns covering the stocks of Brooke Bond, Sasini Tea, Kenya Power and Lighting Company and Eveready. The table below summarises the findings.

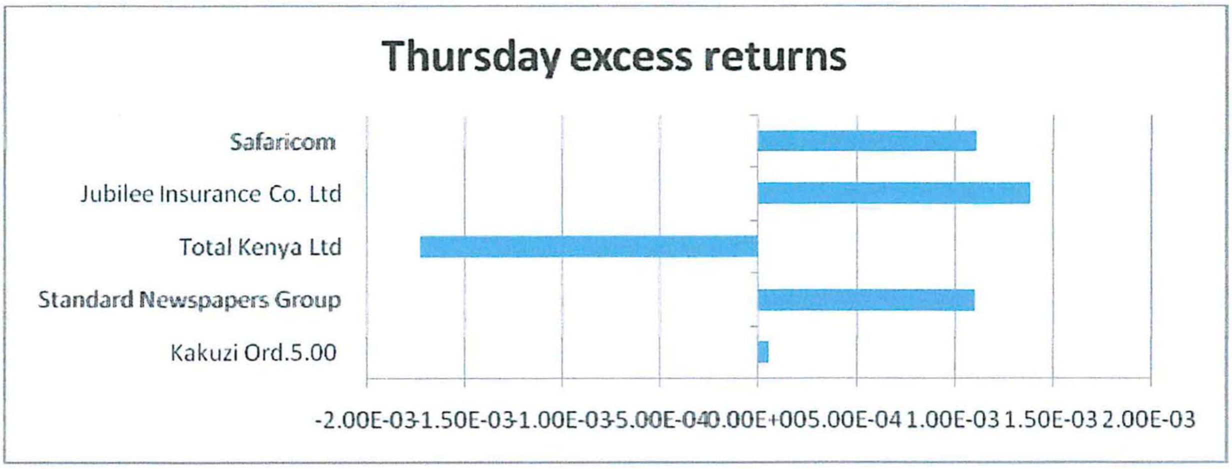
Graph 4.5.3: Wednesday returns for individual stocks



4.5.5. Thursday Returns

Thursday recorded one major decline in returns: Total Kenya with a drop of 0.173. The rest of the statistically different return changes were very minimally positive. It would be fair to summarise the average Thursday returns as fairly stable with very minor drops and increases. This can be shown by the table below.

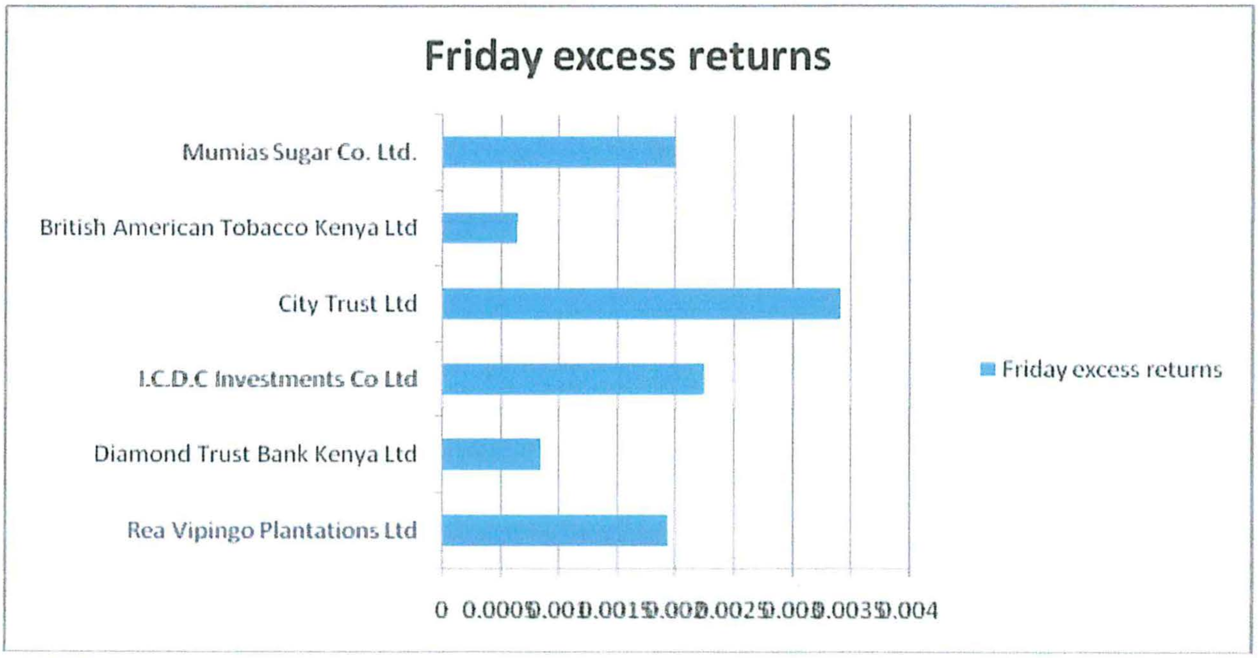
Graph 4.5.4: Thursday returns for individual stocks



4.5.6. Friday Returns

Friday was the only day of the week showing purely positive though very slight returns for the stocks that had a statistically significant different return. Leading the pack was City Trust investments followed by ICDC ivestments limited and Mumias sugar limited that coincidentally showed drops on Monday and Tuesday. The table below summarises the Friday findings.

Graph 4.5.5: Friday returns for all stocks



4.6. SUMMARY OF FINDINGS

4.5.7. Calendar effect in the NSE 20 index

On average the highest return is observed on Friday. However, these returns are not significantly different from those observed on Monday. This difference in returns is significant for Monday, Tuesday, Wednesday and Thursday. The returns prove that there indeed is a 'Monday Effect' with the returns on Monday being the highest of the week and statistically significant. The sub-period month of the year returns show seasonality in a pattern similar to those of the entire period. Also in a manner similar to the day of the week, the effects are stronger in the first sub-period (2001 to 2006) than they are for the period of 2001 to 2013. January and December still exhibit the highest returns.

However, the effect appears to diminish in the period 2006 to 2013. Although the returns are different from each other, their p-values are below the 0.05 threshold. This indicates that the difference in returns may not be significant after all.

4.5.8. Calendar effects in the individual stocks

It is evident that there in minimal effects exhibited in the individual stocks. However, the most positive returns were exhibited on Friday and the most negative were experienced between the days of Tuesday and Wednesday. However, this must be taken in the context of how long the companies have been listed on the NSE.

CHAPTER FIVE: DISCUSSION

5.1. INTRODUCTION

This chapter intends to summarise the findings of the dissertation. Furthermore, it studies the conformity of the findings to previous studies that were mentioned in the literature review. The areas of deviation from any documented studies and theories are also discussed and described. Due to the fact that this is an exploratory study, causative relationships will not be proposed for the described anomalies.

Also included in this section is an account of the accomplishment of the objectives set out in the first chapter. Each objective will be discussed independently and will be accompanied by a section discussing the suitability of the methodology applied to achieve each objective.

To conclude the chapter, suggestions on possible future action points and research areas will be covered. Specific areas that posed as limitations to the study will be discussed.

5.2. SUMMARY OF STUDY OBJECTIVES AND METHODS

This study set out to i) establish whether the Nairobi Securities Exchange is prone to the day of the week and month of the year effect and ii) identify the stocks most prone to the day of the week and month of the year effects in the Nairobi Stock Exchange in the event that the effect did exist. The period of study was between the years 2001 and 2011. In order to achieve this, two sets of raw data were used namely stock prices and NSE 20 index levels for the period under study.

The data was thereafter used to come up with variables that would be used and were divided into two categories: The first category is the independent variable namely the log returns of the stock prices at different time periods. In the case of the 'day-of-the-week effect, the time period (t) would refer to a particular day from a five day stock trading week. In the 'month-of-the-year' effect, the time period (t) would be a particular month from a twelve month calendar. The second category would be made up of the average of log returns for a particular day of the week or month of the day would be calculated. As a result, there would be five log returns that represent average returns for the five trading days in a calendar week and twelve log returns that represent the average returns for the twelve months in a year. Dummy variables were then applied to the left hand side of the equation such that the β coefficient was multiplied by 1 if the average log return was of the period under study and multiplied by 0 if the period was one other than that being studied.

Using this model, the p-values of the β coefficients are judged on whether they are statistical significant. If the excess daily returns on Tuesdays, Wednesdays, Thursdays and Fridays, either positive or negative, are significantly different from Mondays' mean return, then the day of the effect exists for Monday. The same is repeated for all the days of the week and months of the year.

The calendar effect is also investigated in the volatility in returns. This is informed by the fact that while returns may exhibit one pattern, the volatility of returns may follow a different pattern. Calendar effects in volatility were studied using the ARCH (Autoregressive Conditional Heteroskedastic) process. While OLS operates under an assumption of constant variance, the ARCH process introduced in Engle (1982) allows the conditional variance to change over time as a function of past errors leaving the unconditional variance constant.

5.3. SUMMARY OF FINDINGS

5.3.1. Calendar effects in the NSE 20 index

Based on the results of the NSE returns index and volatility trends, it can be deduced that there is a weak calendar effect in the NSE for the period between 2001 and 2013. The seasonality that is demonstrated by the calendar effect show a reverse Monday effect i.e returns on Monday are higher the rest of the week. Interestingly, the returns start to peak on Friday and climax on Monday.

The Month of the year effect was established with the months of December and January demonstrating the highest returns in the year. However, in similar pattern to that of the day of the week, the effect seems to diminish in the second sub-period of 2006 to 2013. Of interest were the apparent positive returns in May and August. This was not anticipated and is not similar to any documented calendar effect that is supported by an underlying explanation.

The volatility in different moths of the year showed consistency in both sub periods considered and in one case (August) actually increased. This demonstrates a possible seasonality in market activity that coincides with certain calendar points. It is also indicative of a 'Random walk with drift' phenomenon that may be mistaken for seasonality in volatility.

The calendar effect has been demonstrated through the findings recorded in the preceeding chapter. However, when the sample was split into two sub-periods, it was clear that the seasonality in returns was slightly diminished in the period covering 2006 to 2013. In contrary fashion, the seasonality in volatility was maintained and even in some cases increased.

5.3.2. Calendar effects in the NSE individual stocks

The calendar effect with regard to individual stocks was not observable. Kurtosis results show the stocks of East African Portland Cement Company, Kenya Reinsurance and KenGen Ltd. with the highest kurtosis which point to the possibility of stagnation of prices leading to nil returns being a common occurrence. In general, no significant differences were observed between stocks and their returns in different days of the week. With regard to volatility, there was no stock with a clear effect that was easily identifiable. The closest to some form of patterned returns is exhibited by Limuru Tea stocks which had some difference in return with other stocks on Monday, Wednesday and Friday.

This could be a result of the stocks actually being held in portfolios. Portfolio stocks would mean that the re-balancing of portfolios by fund managers or other motivations to buy or sell individual stocks within a portfolio would distort any pattern that was observed on the NSE index. However, this is not a conclusive rationale and further research would be needed in this area.

With regard to specific stocks, the highest negative return was recorded on Tuesday while the highest positive return was recorded on Friday. However, the dip in returns was experienced in few companies but was more significant that the increase in prices. The increase in prices was experienced by more companies but was smaller in magnitude. The Friday increases were on average 0.3% to 0.05% higher than other days returns. The almost non-existent calendar effect in the individual stocks could further point to the existence of portfolios that were constantly re-balanced resulting in the calendar effect being present in the whole index but not individual stocks.

No month of the year effect was observed as all the months did not show any significant changes in the returns.

5.4. RECOMMENDATIONS

Due to the apparent diminishing calendar effects, the Kenya Revenue Authority should probably wait for the effects to completely disappear before any form of capital gains tax is introduced. This will help prevent the use of capital gains tax as a tax shield through the use of tax loss harvesting by investors who can take advantage of calendar anomalies.

However, the almost nonexistent seasonalities in individual stocks could mean that on the whole, the use of tax losses may not be an effective tool as wished by investors.

5.5. LIMITATIONS

The study did not factor in public holidays. This may have introduced a biased since it is possible that investor behaviour and price trends may be different for pre and post holiday periods.

The effects were tested for both currently and previously listed companies. Knowledge on the calendar effects for previously listed companies may not be as relevant as findings on the currently listed companies.

5.6. AREAS FOR FURTHER RESEARCH

Further research needs to be done on the presence of holiday effects. It was noted that there were approximately 191 public holidays over the 11 year period that may form an adequate data set for study.

Additionally, it would be beneficial to study other effects such as the half year and half-of-the month effects on the NSE.

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APPENDIX A: COMPANIES LISTED ON THE NAIROBI SECURITIES EXCHANGE (2001-2013)[1]

Company	First trading day*	Last trading day*	No. of trading days
Brooke bond	January 2, 2001	December 31, 2003	753
Eaagads Ltd Ord 1.25	January 2, 2001	December 31, 2013	3288
Kakuzi Ord.5.00	January 2, 2001	December 31, 2013	3286
Kapchorua Tea Co. Ltd Ord Ord 5.00	January 2, 2001	December 31, 2013	3288
Limuru Tea Co. Ltd Ord 20.00	January 2, 2001	December 31, 2013	3288
Rea Vipingo Plantations Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Sasini Tea & Coffee Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
George Williamson Kenya Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Car & General (K) Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
CMC Holdings Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Marshalls (E.A.) Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Sameer Africa Ltd Ord 5.00	January 3, 2007	December 31, 2013	1767
Barclays Bank Ltd Ord 10.00	January 2, 2001	December 31, 2013	3288
C.F.C Bank Ltd ord.5.00	January 2, 2001	December 31, 2013	3288
Diamond Trust Bank Kenya Ltd Ord 4.00	January 2, 2001	December 31, 2013	3288
Equity Bank Ltd Ord 5.00	September 1, 2006	December 31, 2013	1855
Housing Finance Co Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Kenya Commercial Bank Ltd Ord 10.00	January 2, 2001	December 31, 2013	3288
National Bank of Kenya Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
NIC Bank Ltd 0rd 5.00	January 2, 2001	December 31, 2013	3288
Standard Chartered Bank Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
The Co-operative Bank of Kenya	December 22, 2008	December 31, 2013	1264
Express Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Hutchings Biemer Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Kenya Airways Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Nation Media Group Ord. 5.00	January 2, 2001	December 31, 2013	3288
Scangroup Ltd Ord 1.00	August 29, 2006	December 31, 2013	1858
Standard Newspapers Group Ord 5.00	January 2, 2001	December 31, 2013	3288
Tourism Promotion Services Ltd Ord 5.00 (Serena)	January 2, 2001	December 31, 2013	3288
Uchumi Supermarket Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Athi River Mining Ord 5.00	January 2, 2001	December 31, 2013	3288
Bamburi Cement Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Crown Berger Ltd 0rd 5.00	January 2, 2001	December 31, 2013	3288
E.A.Cables Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
E.A.Portland Cement Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
KenGen Ltd. Ord. 2.50	May 17, 2006	December 31, 2013	1869
Kenya Oil Co Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Kenya Power & Lighting Ltd Ord 20.00	January 2, 2001	December 31, 2013	3288
Total Kenya Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
British-American Investments	September 7, 2011	December 31, 2013	580
CFC Insurance	April 21, 2011	December 31, 2013	674
Jubilee Insurance Co. Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Kenya Re-Insurance Corporation	August 27, 2007	December 31, 2013	1599
Pan Africa Insurance Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
I.C.D.C Investments Co Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
City Trust Ltd Ord 5.00	January 2, 2001	June 24, 2013	3156
Olympia Capital Holdings ltd Ord 5.00	January 4, 2005	December 31, 2013	2273
Trans-Century	July 14, 2011	December 31, 2013	618
A.Baumann & Co.Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
B.O.C Kenya Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
British American Tobacco Kenya Ltd Ord 10.00	January 2, 2001	December 31, 2013	3288
Carbacid Investments Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
East African Breweries Ltd Ord 10.00	January 2, 2001	December 31, 2013	3288
Eveready East Africa Ltd Ord.1.00	December 18, 2006	December 31, 2013	1779
Kenya Orchards Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
Mumias Sugar Co. Ltd. Ord 5.00	November 14, 2001	December 31, 2013	3061
Unga Group Ltd Ord 5.00	January 2, 2001	December 31, 2013	3288
AccessKenya Group	June 5, 2007	December 31, 2013	1639
Safaricom	June 10, 2008	December 31, 2013	1397
Unilever Tea Kenya Ltd Ord 10.00	January 2, 2004	December 24, 2007	1029
Firestone East Africa Ltd Ord 5.00	January 2, 2001	December 29, 2006	1519
Dunlop	January 2, 2001	December 30, 2004	1010
E.A.Packaging Ltd Ord 5.00	January 2, 2001	May 24, 2011	599

[1] Source: Nairobi Securities Exchange website http://www.nse.co.ke/listed-companies/list.html