EFFECT OF SEASONAL MARKET ANOMALIES ON STOCK MARKET RETURN AMONG COMPANIES LISTED AT THE NAIROBI SECURITIES EXCHANGE KENYA

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DECLARATION

I declare that this research dissertation is my original work and has not been previously published or submitted elsewhere for the award of a degree. I also declare that it contains no materials written or published by another person except where due reference is made and the author duly acknowledged.

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ABSTRACT

Many researchers both globally and locally have demonstrated that stock markets are inefficient as investors can rely on the calendar/seasonal market anomalies to gain abnormal returns. These studies have continued to contradict the Efficient Market hypothesis theory which exhibits that stock market is efficient. The inefficiency of the stock market is believed to be as a result of the volatility of the stock returns. This study therefore investigated the effect of seasonal stock market anomalies on the stock market returns among companies listed at the Nairobi Securities Exchange. The main objective of the study was to determine the weekend effect, turn of the month effect and holiday effect anomalies on the stock market return among Companies listed at the Nairobi Securities Exchange in Kenya. The study sampled NSE - 20 share index closing prices from September 2000 to December 2019. Data was obtained from the Nairobi Securities Exchange database. All the data collected were first input into an excel sheet and then analysed using Stata version 12 software. Characteristics of the data for each seasonality; weekend effect, turn of the month effect and holiday effect was analysed using descriptive statistics then EGARCH (1,1) model and results obtained for both the mean and variance equation. The mean analysis results showed the presence of the weekend effect and turn of the month effect on the stock market returns of the NSE 20 Share Index at the Nairobi Securities Exchange while the results failed to confirm existence of holiday effect at the NSE. The variance analysis for the three independent variables showed a positive asymmetric term, implying that positive shocks have greater impact on volatility more than negative shocks of the same magnitude. Positive information in the stock market generates less variance or volatility in the market since positive return translates to high equity prices. This implies that volatility tends to decrease when the stock market returns at the NSE increases than when the stock market decreases with the same amount.

Key Words: EMH, NSE-20 Share Index, EGARCH (1,1), NSE, Seasonal Market Anomalies, Stock return, Volatility, Weekend effect, Turn of the month effect, Holiday Effect

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DEDICATION

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ACRONYMS AND ABBREVIATIONS

AIC	Akaike's Information Criterion
ADF	Augmented Dickey-Fuller
ARCH	Auto Regressive Conditional Heteroskedasticity Model
ANOVA	Analysis of variance
BIC	Bayesian Information Criterion
D	Dummy
EGARCH	Exponential Generalized Auto Regressive Conditional Heteroskedasticity Model
EMH	Efficient Market Hypothesis
GARCH	Generalized Auto Regressive Conditional Heteroskedasticity Model
HE	Holiday Effect
IGARCH	Integrated Generalized Autoregressive Conditional Heteroskedasticity
PGARCH	Periodic Generalized Auto Regressive Conditional Heteroskedasticity Model
M-GARCH	Multivariate Generalized Autoregressive Conditional Heteroskedasticity
NSE	Nairobi Securities Exchange
NHD	Non-Holiday Days
NTOM	Non-Turn of the Month
NASI	Nairobi All Share Index
OLS	Ordinary Least Square
P-GARCH	Periodic Generalized Auto Regressive Conditional Heteroscedasticity
T-GARCH	Threshhold Generalized Auto Regressive Conditional Heteroscedasticity Model
TOM	Turn of the Month
USD	United States Dollar

OPERATIONAL DEFINITION OF TERMS

Holiday Effect Anomaly: - Refers to the period when the stock returns are significantly higher before holidays than operational days (Gama& Vieira,2013).

Stock Market Returns: - Refers to the yield that is generated by investing in the stock markets. which could be in the form of profits when trading or dividends when issued by companies to its shareholders (Ahmed,2018). In the Secondary market, speculators purchase stocks at low costs and sell at significant expenses whereby they may procure benefit or misfortune.

Seasonal Market Anomalies: - Is the price action that contradicts the expected behaviours of the stock market (Kuria & Riro,2013). It goes contrary to the Efficient Market Hypothesis where it is believed that it is impossible to make a profit as all information is already effected in the market (Fama,1970).

Turn of the month effect: - Is the pattern where the stock values go up on the last day of each trading month with the prices continuing for the first three trading days of the next month (Adago,2016).

Weekend effect Anomaly: - According to this effect, daily returns are positive before the close of business and tend to be negative after reopening (Balbina&Martinr,2002).

CHAPTER ONE

INTRODUCTION

1.1 Background information

Eugene Fama formulated the Efficient Market Hypothesis in 1970. He described it as "efficient security market as a market where prices fully reflect all available information both historical, past, present and insider". Concerning the Efficient Market Hypothesis (EMH), Fama (1970) noted that it is not possible to make irregular benefit since all components have been considered and captured in the stock prices.

Numerous examinations done have affirmed Fama's contention of the Efficient Market Hypothesis while other outcomes from other investigation repudiate Fama's contentions. They have demonstrated that market anomalies exist and speculators are probably going to make benefit by utilizing historical price market behaviour i.e. the weak form of an efficient market hypothesis. The efficient market hypothesis is fundamental and a focal pillar that is needed by investors and other important market players to make an informed decision (Osoro,2015).

According to Ozturk, Uysal, Arslan and Kayhan (2018), inefficient markets exist hence seasonal market anomalies, such as the day of the week effects, turn of the month effect, holiday effect, pre-holiday effect, weekend effect among other anomalies. These anomalies are referred to as calendar anomalies or seasonal anomalies. Accordingly, (Poshakwale,1996) asserted that day of the week anomaly exist in the stock market and he referred to it as the presence of a pattern on the stock returns whereby the higher returns are associated with a particular day of the week. Holiday effect anomaly was defined to be the period when the stock returns are significantly higher before holidays than operational days (Gama &Vieira,2013). Sawitri and Astuty (2018) asserted that month of the year is the time when the stock price increase or decrease from month to month in one trading year in a financial market or the difference in monthly returns in each month of the year. While (Adago,2016) refers to turn of the month effect as the pattern where the stock values go up on the last day of each trading month with the prices continuing for the first three trading days of the next month.

Ozturk et al (2018) explained that volatility in stock prices are as a result of the calendar effect. Price shocks are an indispensable piece of the securities exchange. The progression of news is persistent and essentially boundless, and occasionally some of them might be persuasive for a given stock market (kudryavtsev, 2019).

The presence of anomalies in the stock market has remain a question of concern for investors as the concept of Fama's EMH was accepted by many researchers for a long time (Jebran &Chen,2017). This also explains why security price anomalies have attracted a lot of researchers over the years (Wakarindi,2015). The question though remains as to why different researchers who have researched on the calendar anomalies end up getting different outcomes. Could it be the scope of the research or the methodology used in the analysis? This study therefore examined the effects of the seasonal anomalies; weekend effect, turn of the month effect and holiday effect on stock market return using the EGARCH Model.

1.1.1 Seasonal Market Anomaly

Anomalies are classified into three categories mainly; calendar, fundamental and technical anomalies (Qureshi et al.,2015). In this study, we looked at the calendar anomaly also referred to as seasonal market anomaly. Seasonality refers to the consistent and continuous fluctuation in the stock price over a period of less than a year (Kuria&Riro,2013). The inconsistency and irregularities are called market anomalies.

Various researchers have researched on the seasonal stock market anomalies and several definitions and findings arrived at. Nageswari and Selvam (2011) investigated the existence of seasonality by looking at the day of the week effect and Monthly effect anomaly in the India Stock market. They found out that volatility in the stock market was more on Monday and least on Thursday, this was contrary to the norm that returns are positive on Fridays and negative on Mondays (Onyuma,2009).

Keim (1983) was the first to study the January effect (month of the year effect). He found out that stock returns are higher in January compared to other months of the year. The same finding was replicated by Sawitri & Astuty (2018). The reasons for the similarity in both studies was that most investors tend to reduce tax obligation which is associated with the closure of the year. Ozturk et al. (2018) in their study of days of the week, January effect and Ramadan effects concluded that the Turkish market is more efficient hence they concurred with Fama's Efficient Market Hypothesis. The main explanation given was that time differences do not impact on the strategies of Turkish Investors. Gakhorich (2011) also defined public holidays as a day financial stock markets close and do not trade, excluding weekends. Holiday effect was first identified by (French,1980), Gama and Vieira (2013) and Karadzic (2011) they described the holiday effect anomaly as a period where stock returns are significantly higher before holidays than operational days. Latif et al. (2011) in their

examination inferred that abnormities in the financial exchange are brought about by; new data not balanced as they show up, contrasts in tax assessment, capital modifications and conduct obliges of speculators. Turn of the month effect was first documented by Ariel (1987). He looked at the US stock returns and found that the mean return was higher and positive days immediately before the month end and the first few days after the start of the following month.

Wong et al. (2006) in their study discovered that there is the disappearance of Calendar anomalies from the Singapore Market and probably in other financial market and that the markets are becoming more efficient. They concluded that the disappearance of the calendar anomalies might be caused by; more exposed and informed investors, advancement in technology, availability of information at low cost among others.

1.1.2 Stock Market Return

Ahmed (2018) stated that Stock market returns are the profits that the investor gets from the trading on shares. The buying and selling of stock happen in various stock markets, whereby investors predict the market by buying when the stock prices are low with the expectation that the demand will rise and they will sell at a higher price hence more return (Marret,2011). Inventors have the opportunity to get stock market returns which are generated by the stock market. Financial returns are in various forms, they are referred to as profits when trading and dividends when issued by the Company to its shareholders (Osoro,2015).

Volatility, on the other hand, is the measure of the rate of fluctuations in the security prices. The connection between volatility and stock returns has been a topic of conversation for quite a while however most investigations show that there exists a negative asymmetric relation. This implies a negative return is related to an increase in volatility while positive returns are related to the decline in volatility (Wakarindi,2015). Camphell and Hentschell (1992) report that an expanding securities exchange volatility raises the required rate of return for normal stocks and consequently brings down stock prices.

As much as investors look at the expected return of the stock before buying, it is also important that they also look at the volatility of the stock price. Risk-averse investors should therefore, consider both returns and variances of security assets (Yalcil &Yucel 2006). Burement et al.(2004) said that it is critical to know whether high volatility of the stock price is identified with high volatility for a given day supposing that speculators could recognize

a specific pattern for the day, they could modify their situation in the financial exchange to stay away from high volatility in their portfolio. Cheteni (2016) noted that when the markets are volatile, news about the market tend to be negative and as a result investors make emotional decisions concerning their investments.

1.1.2 Nairobi Securities Exchange

The Nairobi Securities Exchange (NSE) previously known as Nairobi Stock Exchange was established in 1954. It is a main African trade, situated in Kenya one of the quickest developing economies in Sub-Saharan Africa. NSE demutualized and self-listed in 2014. The NSE involves roughly 66 recorded organizations classified into eleven (11) sectors. NSE works under the ward of the Capital Market Authority of Kenya (NSE,2020).

The NSE's principle commitment is to manage the purchasing and selling of stocks, they give a stage where they interface Companies with speculators (Mukanzi, Mukanzi & Maniagi, 2016). The NSE has contributed decidedly to the development of the economy in Kenya by giving an empowering domain to Companies and general society to exchange competitively (Riany,2016).

Stocks can be assembled utilizing either weighted normal or market capitalization. People or organizations can without much of a stretch pick which files to exchange as opposed to exchanging on singular stocks. Stores are less unpredictable/stable thus less unsafe. There are different lists at Nairobi Securities Exchange to be specific; NSE All Share Index (NASI), NSE 20 Share Index, NSE 25 Share Index, FTSE NSE 15 Index, FTSE NSE 25 Index among others (NSE,2020).

The NSE 20 Share Index was introduced in the market in 1964. It represents the price-weighted - index determined as a mean of the 20 best performing counters. The firms making up the NSE 20 Share Index had to meet the following criteria; the market capitalization, share traded, deals/liquidity and turnover during the period under review are weighed in the ration 4:3:2:1 respectively. The company must have at least 20% of its shares quoted at the NSE, must have a minimum capitalization of Kshs.20million and company should be a blue chip with superior profitability and dividend record. NSE 20 share index go along with the NSE 25 Share Index (which looks at the top 25 performing firms) and the Nairobi All Share Index (which considers all the listed firms) as the indices as the bourse (NSE,2020).

For this examination, we concentrated on the NSE 20 Share Index and spotlight on those Companies which were recorded under this classification. The Companies making up NSE 20 Share Index incorporate Banking Sector; Barclays Bank of Kenya Ltd, Diamond Trust Bank Ltd, Equity Group Holding PLC, KBC Group Plc, NIC Group Plc, Standard Chartered Bank Kenya Ltd and Co-operative Bank of Kenya Ltd. Commercial and Services Sector; Nation Media Group Plc, WPP Scan bunch Plc and Kenya Airways Plc. Construction and Allied Sector; Bamburi Cement Ltd .Energy and Petroleum Sector; KenGen Co. PLC, and Kenya Power and Lighting Co. Ltd. Insurance Sector; Britam Holding PLC and Kenya Re-Insurance Corporation Ltd; Investment Sector; Centum Investment Co. Investment Services Sector; Nairobi Securities Exchange PLC. Manufacturing and Allied Sector; British America Tobacco Kenya Plc and East Africa Breweries Ltd lastly Telecommunication Sector; Safaricom Plc (NSE, 2020).

1.2 Statement of the problem

Security markets are characterized by perfect information and stock prices are reflective of the information in the market (Latif et al., 2011). New Information is delivered consistently and with mechanical ability, it spread extremely quick consequently guaranteeing that the market is continually effective (Kansal & Singh, 2016). However, in a typical market tasks, it is difficult to get a productive market where all data is accessible to all speculators at prior, homogenous desires and zero exchange cost (Kuria & Riro, 2013).

Despite NSE undertaking various measures to enhance security returns, the sector's performance is still below expectations as inefficiency is often experienced and investors and other market players are likely to benefit (Kuria & Riro, 2013). The presence of seasonal market anomalies has remained to be one of the biggest threat to market efficient concepts as they influence investors returns when observed effectively (Adago.2016). Njogo (2017) although observed that anomalies are often discovered in the security markets then they disappear once traders exploit them to earn excess returns.

Previous studies conducted both in developed and developing economies have continued to give conflicting results on the existence of seasonal anomalies in the stock markets. Most studied have contradicted EMH while others have alluded by it; (Sawitri & Astudy ,2018), (Dodd& Gakhovich ,2012) confirmed holiday effect in Central and Eastern Europe, (Jebran & Chen ,2017) confirmed calendar anomalies in Pakistan while (Nageswari et al.,2011) confirmed day of the week and weekend effect in India Stock Market.

Studies done locally have given mixed findings;(Musimbi,2015) examined the turn of the month effect using paired t-test and regression analysis and failed to confirm presence of turn of the month effect on stock return as the effect was very minimal. Oyori (2011) investigated the day of the week effect using descriptive statistics and multiple regression analysis and concluded that day of the week effect exist in the NSE stock market, (Omar,2015) used regression analysis and confirmed presence of pre and post-holiday effects at NSE, (Ondiala,2014) used t-test, the results could not confirm presence of the turn of the month effect at NSE, Kuria & Riro (2013) and Wafula & Olaleye (2018) used t-test and ANOVA they confirmed presence day of the week effect, weekend effect and monthly effect seasonal anomalies. These studies used OLS in their analysis, OLS is a homoscedastic model as it assumes constant volatility hence the results might be misleading to investors as they only capture the mean return but not the variance equation. Connolly (1989,1991) also claims these approaches have limitation and other problems such as serial correlation and heteroscedasticity on the residual yields.

Wakarinda (2015) and Odago (2016) studied the effect of calendar anomalies on the stock returns volatility by comparing the OLS Model, GARCH (1,1) and T-GARCH Model. The findings showed that the day of the week is statistically significant in both models with Friday having the highest returns and Monday lowest return. The January effect was explained in the OLS while GARCH (1,1) did not show any presence of it.

From the review of the studies done locally, use of EGARCH has not been explored hence this study sort to provide new evidence on the effect of seasonal market anomalies on stock market return by using EGARCH (1,1). EGARCH model was introduced by (Nelson,1991) to handle financial time series data and particularly to allow for asymmetric effect such as the leverage effect, in which negative shocks have a greater effect on conditional volatility than positive shocks on the same magnitude. It is also ideal for volatility clustering for instant, when large(small) price changes tend to follow large (small) price changes. Investors can easily monitor the patterns to make informed investments decisions.

1.3 The objective of the study

1.3.1 General Objective

To determine the effect of seasonal market anomalies on the stock market return among Companies listed at the Nairobi Securities Exchange in Kenya.

1.3.2 Specific Objectives

1. To determine the effect of the weekend effect anomaly on stock market return among Companies listed at the Nairobi Securities Exchange in Kenya.
2. To determine the effect of the turn of the month anomaly on stock market return among Companies listed at the Nairobi Securities Exchange in Kenya.
3. To determine the effect of holiday anomaly on stock market return among Companies listed at the Nairobi Securities Exchange in Kenya.

1.4 Hypothesis of the study

We tested for weekend effect, turn of the year effect and holiday effect. The null hypothesis was represented by H_{01}.

1.4.1 Weekend Effect

H_{01}: Weekend effect anomaly has no significant effect on stock market return among companies listed at NSE in Kenya.

If the null hypothesis (H_{01}) is accepted the weekend effect does not exist.

1.4.2 Turn of The Month Effect

H_{01}: Turn of the month effect anomaly has no significant effect on stock market returns among companies listed at NSE in Kenya.

If the null hypothesis (H_{01}) is accepted the turn of the month effect does not exist.

1.4.3 Holiday Effect

H_{01}: Holiday effect anomaly has no significant effect on stock market returns among companies listed at NSE in Kenya.

If the null hypothesis (H_{01}) is accepted the holiday effect does not exist.

1.5 Significance of the Study

The results from the research will be relevant to the Capital Market participants such as financial analysts, fund managers, researchers and the regulatory authority.

1.5.1 Financial Analysts

Financial analysts are in charge of advising investors, from the findings of this research they will be able to give sound information that will lead investors to make informed decisions. Information on stock variation may assist financial analysis plan well on when to trade and get abnormal returns or maximize returns.

1.5.2 Fund Managers

The fund manager's main responsibility is to identify viable projects on behalf of investors. They source for information on the various platform while at the same time focus on the behaviour of the stock market so at go give accurate and viable advice to the investors. The findings on this research will be of help as it will enable them to know the best times to invest in the stock market.

1.5.3 The regulatory Authority

The Capital Market Authority as a regulator and policymaker will observe the trends and make policies in line with the information in the markets from the research to influence future trends. The regulators will use the research findings to compare the EMH in Kenya with the international markets for effective decision making.

1.5.4 The Researchers

The findings of this research are aimed at adding knowledge of the Efficient Market Hypothesis concerning the effect of stock market anomalies specifically the weekend effect, turn of the month effect and holiday effect at the NSE and provide possible research gaps. The researchers will be able to critic and come up with possible research areas on the seasonal market anomalies hence improving on the already existing studies. The research was built on conditional variance modelling which has not been extensively looked at locally.

1.6 Scope of the study

The scope of the study was restricted to investigating the effect of seasonal stock market anomalies on stock returns among companies listed at the Nairobi Securities Exchange NSE-20 Share Index was sampled. The Seasonal anomalies in the study are weekend effect, turn of the month effect and holiday effect. The study covered the period between September 2000 and December 2019. The study was limited to 19 Years 3 months because that is what the NSE database had archived.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter captures the theoretical review and empirical review of selected studies done before on the same topic. It presents identified research gaps and methodologies employed in the research area of Seasonal Market Anomalies.

2.2 Theoretical review

This section explains different theories anchoring the study. They include Efficient Market Theory, Prospects Theory and Random Walk Theory.

2.2.1 Efficient Market Theory

This theory was originally developed by economist Eugene Fama in 1970. It states that an investor cannot outperform the market, and that market anomaly should not exist because they will immediately be arbitraged away (Fama,1970). This theory was again acknowledged and supported by (Malkiel ,2003), he too described an efficient market to mean a market where all information both historical, public, private and insider are reflected in the stock prices. Kendall (1953) referred to the Efficient Market Hypothesis as Random Walk Theory, where by the equity value of Companies listed capture all information related to the business operations. He concluded that it might not be easy to outperform the market as stock are fairly priced.

Bhuyan (2018) and Chandra (2017) in their book opposed the concept of efficient market, they urged that most capital markets stock information vary with the existing information hence the notion that the market is efficient might not hold. Samitri and Astuty (2018) in its research said that it might not be appropriate to talk about efficient market in isolation as there exist other factors, variances and anomalies linked with the efficient market hypothesis.

Market efficiency have been categorised into three forms mainly weak form, semi- strong form and strong form of efficiency (Bodie et al., 2012). Weak form is said to occur when the prevailing stock prices have considered the past information associated with the stock price. With the past information already captured in the stock price making abnormal returns in the stock market becomes impossible (Novickyte,2014). Hence in weakly-efficient market, analysis past data will not be beneficial to investors. Semi-strong efficient markets

on the other hand, occurs when the prevailing stock prices already captures past information on prices and in addition considers information available to the public i.e. possible mergers and acquisitions, changes in the management, possible takeovers, changes in the government policies among others (Novickyte ,2014). In strongly efficient markets, prevailing stock prices have already considered the past information, information already out to the public and what the insiders know. This implies it is impossible for investors to earn more in this form (Malkiel, 2011).

The above forms of market efficiencies have support Fama's argument although there are varies investors like Warrant Buffett and others researchers who have disputed the efficient market hypothesis theory. They urged that there are other triggers which should be recognised as they are likely to have attributed to the inconsistency in the financial markets. The triggers they say might be as a result of behaviours such us over self-confidence, overreaction, information bias, representative bias, replication among others. This anomaly refutes the efficient market hypothesis by displaying seasonal trends in securities prices at a particular time of the calendar year. The market efficient anomalies contradict efficient market hypothesis (Guo &Wang,2007).

Langat (2014) in its study of the turn on the month effect at the Nairobi Securities in its findings critiques the efficient market theory. The study observed that the mean stock return is higher during the first half of the month and lower during the latter half of the same month. Novickyte (2014) in his journal critique the EMH as it does not capture the instability associated with the stock prices, investors overreaction, periodic returns in the market, asset bubbles among others. In its conclusion, he said that stock market returns are indeed random, and investors are likely to make excess returns. This research used this theory to explain the abnormal returns which investors explore by relying on the weekend effect, turn of the month effect and holiday effect anomalies.

2.2.2 Prospect Theory

Amos Tversky and Daniel Kahneman first formulated prospect theory in 1979. This hypothesis perceived that speculators and people look at the benefits and misfortunes differently, when given a choice between gains and losses in most cases perceived gains win (Tversky &Kahneman,1992). This hypothesis explains the human conduct which in most cases is profit oriented. It goes on and further explain that individual in their decision making do not look at the long term gains rather on the current possible gains and losses. Prospect

hypothesis predicts that people tend to be risk-averse when there are gains expected, or when things are going well, are moderately risk-seeking when losses are experienced, as when a pioneer is within the middle of an emergency. Prospect hypothesis is expected to give a solution on how selection are drawn and analysed in the decision making process.

Kahnemann and Tversky (1979) introduced expected utility hypothesis as an elucidating model of dynamic under hazard and set forward their model - prospect hypothesis. Apparently, when confronted with unsafe possibilities, individuals normally settled on decisions that are not predictable with the normal utility hypothesis. Individuals under weigh results that are simply plausible in correlation with results that are gotten with assurance. This propensity, called the conviction impact, adds to hazard avoidance in decisions including sure gains and to chance looking for in decisions including sure losses. Individuals by and large dispose of segments that are shared by all possibilities viable. This inclination, called the segregation impact, prompts conflicting inclinations when a similar decision is introduced in various structures.

In sparing way prospects theory captures a wide range of investigational evidence on attitudes to risk since it has the potential to shed light on asset prices and investors behaviour (Barberis, Jin & Wang, 2019). The average return depends on return volatility, skewness and a capital gain overhang of the typical small-cap stock (Barberis et al.,2019). The above intuitions make it clear that prospect theory accounts for investors behaviour hence the seasonal anomalies. The study used this theory to explain why the various seasonal anomalies occur and whether they are as a result of the investor's behaviour.

2.2.3 The Random Walk Theory

This hypothesis was invented by (Kendall,1953) and later explored and affirmed by Fama in 1965. The EMH arrived at its pinnacle of ubiquity in the eighties (Shiller, 2003). It was American economist Eugene Fama who contributed the most and whose works in the area of business performance have become iconic. Fama,1965 reported stock price randomness and established the definition of “efficient market” for the first time. He said that the evidence on the Efficient Market Hypothesis was so clear that only large-scale observational studied could abandon it.

Random Walk is a statistical phenomenon where a variable does not follow any distinctive pattern and is simply moving at random. The random walk hypothesis as applied to trading,

set out most explicitly by Burton Malkiel, a professor of economics at Princeton University, and that any attempt to forecast future market movement, either through principal or specialized examination, is purposeless (Malkiel,1999)

The assumption of weak form efficiency is dependable with the random walk theory in that the stock procedure moves arbitrarily and value changes are autonomous of one another (Latiff & Farooq, 2011). The random walk implies that there is seasonality in stock prices as they are entirely random and quite unpredictable (Riany,2016). Mutothlya and Muthama (2013) inferred that security costs, accordingly, follow an irregular walkway and the course and degree of their endeavor from the antiquated information of cost. A recent audit of the business sectors in Africa arranged Nairobi Securities Exchange as one which has the propensity towards week form efficiency (Owido,Onyuma &Owuor ,2013) .

The principle reactions of the Random Walk Theory are that the financial exchange comprises of countless speculators and the measure of time every financial specialist spends in the market is unique. Accordingly, for patterns to rise in the costs of protection in the short run, and an acknowledgeable speculator can beat the market by deliberately purchasing stocks when the cost is low and selling stocks when the value us high inside a brief timeframe. Different researchers contend that the whole premise of the Random Walk Theory is spilt and that stock costs do follow patterns, significantly as time goes on. They contend that on the grounds that the cost of security is influenced by an amazingly huge number of elements, it might be difficult to recognize the example or pattern followed by the cost of that security, but since an example can't be distinguished, that doesn't imply that an example doesn't exist (Premkumar,2019).

Mutothya and Muthama (2013) researched the RWH of the stock costs on the NSE and discovered that the stock costs were not fluctuating haphazardly for the period under investigation. Smith (2019), in his investigation, presents that adjustments in stock costs have a similar conveyance and are free of one another. Consequently, it accepts that past developments or patterns of a stock cost or market can't be utilized to foresee its future developments (Smith, 2019). This theory therefore, helped us understand why stock market returns fluctuates and exhibit a pattern on the variables; weekend effect, turn of the month, and holiday effect at the Nairobi Securities Exchange.

2.3 Empirical Review

The empirical literature is derived from or relates to experiment and observation rather than theory. In social science, empirical literature refers to a review of studies done by other scholars. The empirical literature review should be guided by research objectives. In this section, we developed subheadings reflective of the specific research objectives.

2.3.1 Weekend effect on stock market return

Many researchers have explored the weekend effect both locally and internationally. In the Asia Market, Nagesswari and Selvam (2011) explored the presence of regularity in the Indian securities exchange. BSE Sensex list was picked for 10 years from 1st April 2000 to 31st March 2010. They looked at the day of the week and the monthly effect pattern. Methodologies used were descriptive statistics which include daily return, standard deviation, Skewness, Kurtosis, Kruskall-Wallis Test and Linear Regression Model. They discovered that day of the week and monthly effect designs didn't seem to exist in the Indian Stock Market during the period.

Charles (2013) studied the day of the week effect on volatility majoring on the role of asymmetry. He explored the observational effect in five significant global records; France, Germany, United States, United Kingdom and Japan securities exchanges. GARCH Model was utilized to break down the information. The outcomes varied for each model utilized henceforth, they reasoned that the decision of a model ought to be considered as a factor that impacts the day of the week. He again likewise discovered that asymmetry doesn't impact the seasonal effect.

Al-jafari (2012) looked at the empirical investigation of the day of the week on stock returns and volatility from the Muscat Securities Market. GARCH (1,1), TARCH and E-GARCH (1,1) methodologies were utilised. The finding showed that there was no presence of the day of the week effect. GARCH (1,1) suggested high persistence in conditional volatility of stock returns. He concluded that EARCH models did not show evidence of asymmetry in stock returns.

In Africa, Pradhan (2018) researched the day of the week impact on Johannesburg stock exchange indices between 1995 and 2016 utilizing GARCH Model. He discovered that there was the presence of the day week in both volatility and return equation. Better yields were

seen on Monday and low profits for Friday while volatility supposedly appeared in all the exchanging days of the week.

Ndako (2013) researched the day of the week effect on securities exchange returns and unpredictability in Nigeria and South Africa over pre-advancement and post-progression periods. The paper utilized the Exponential Generalized Autoregression Conditional Heteroscedasticity (EGARCH) model to appraise the day of the week impact both in the mean and fluctuation conditions (Nelson,1991). The Post-progression period for the Nigerian value advertise uncovers the day of the week impact on Friday just in the mean condition. In the difference condition, there was proof of the day of the week impact on Tuesdays and Thursdays individually. In South Africa, there exist the day of the week impact on Mondays and Fridays during the pre-advancement period. There is proof of the day of the week impact on Thursdays in the mean condition and Fridays just in the change condition.

Tachiwou (2010) investigated the day of the week effect in West Africa Regional Stock Market between 1998 to 2007 using two stock index, the Brvm-10 Index and Brvm-Composite Index. The study utilised the descriptive statistics in its data analysis. The investigation observed daily patterns exhibit lower daily mean and lower standard deviation. Lower daily mean was observed on Tuesdays and Wednesday and higher pattern observed on Thursdays and Fridays.

Muhammad (2010) examined the efficient market hypothesis and market anomalies; evidence from the day of the week effect of Malaysian Exchange for 8 years. He used the OLS model was adopted in the analysis. The market was divided into two subgroups because of the financial crisis experienced in the market within the periods. They concluded that the weekend effect was present in the Malaysian Market. Although the weekend effect did not exist in the two subgroups.

Locally, Kiigi (2017) examined the seasonality impact on securities exchange returns at the NSE. The target of his examination was to determine the presence of the day of the week effect and the month of the year effect on the NSE. The study adopted a descriptive and inferential research design in obtaining information. The NSE 20-share Index was selected

to represent the overall daily stock prices. The investigation discovered that Friday had the least negative returns while Monday had the most elevated positive returns. The stock market returns at NSE were also established to be relatively higher in January. The study concluded that there was the presence of seasonality influence at NSE but its effects are minimal.

Rutto (2014) discussed the Monday effect on the stock returns at the Nairobi Securities Exchange. The logarithm mean of the stock average return of the NSE 20 Share Index was analysed. The study used descriptive statistics to determine the relationship between the variables. The findings confirmed the Monday Effect Theory. High stock prices were recorded on Friday and lowest on Mondays.

Kuria and Riro (2013) looked into the seasonal effects on average returns of the Nairobi Securities Exchange. They analysed the nearness of the day of the week impact, end of the week impact and month to month effect anomalies. They utilized the t-test and ANOVA investigation model in the examination. The investigation gave proof of the presence of the seasonal effect in the NSE.

Kerubo (2011) researched the day of the week effect in the NSE. The primary target of the investigation was to look at the nearness of the day of the week impact in NSE. The analyst utilized a regression analysis. The discoveries affirmed the presence of the day of the week anomaly in the NSE 20 - Share index.

2.2.3 Turn of the month effect on stock market return

Turn of the month effect was first archived by Ariel (1987) he studied the US stock returns and found that the mean return for stock is positive only for days immediately before and during the first half of calendar month and indistinguishable from zero for days during the second half of the month.

In Europe, Depenchok et al.(2010) examined the calendar anomalies in the Ukrainian financial market. They looked at the January effect, weekend effect and turn of the month by utilising regression analysis. They found no evidence of the January effect or a weekend effect in the Ukrainian stock and bond market. The results although confirmed that turn of the month effect exist in the Ukrainian financial market.

Caporale (2016) investigated anomalies in the Ukrainian Stock Market. The study looked at the PFTS index.Varies statistical technique anomalies were used in the analysis e.g.

ANOVA, regression analysis with dummy variable and simulation approach test. Day of the week effect; Turn of the month effect; Month of year effect; January effect; Holiday effect; Halloween Effect. The research showed that general calendar anomalies are not present in the Ukrainian stock market. Exceptions were although recorded for the turn of the year and Halloween Effect.

In the Asian market, Safeer et al.(2014) did a study on market anomalies in Indian stock market by comparing the averages of the mean of the Index values of BSE Index from the year 2018 to December 2012.They looked at the weekend effect, turn of the month effect and turn of the year effect both in terms of price and volume and stock split effect on five selected Companies. They adopted t-test for data analysis. They found out that turn of the month effect are minimally visible but not statistically proven for the analysed period. In contrary, Sudarvel et al.(2016) examined the semi month and turn of the month effect in Indian stock market using descriptive statistics and paired 't' test. There found out that semi month effect and turn of the month effect does not exist in India i.e. the stock market in India is efficient.

Jebran and Chen (2017) examined anomalies in the Islamic equity market of Pakistan. They looked at the January effect, time of the month effect, turn of the month effect and half of the month effect. They used descriptive statistics method to test the behaviour of the data and GARCH model was applied to capture the seasonality in returns and volatility. The findings did not confirm the famous January and Ramadhan effect. Although the study found significant Day of the week effect, turn of the month effect, time of the month effect and half of the month effect in the Islamic index. It confirmed that investors would be able to gain abnormal returns.

In the Africa Market, Darrat (2015) examined the presence of seasonal effect in the South Africa market using the daily data from January 1973 to September 2012.Three types of seasonality's were studied; day of the week, beginning of the month and month of the year. GARCH model was used in the analysis. The findings showed presence of Monday and Tuesday Effect, beginning of the month was also pronounces in the second and third trading days' return.

Giovani (2014) investigated the turn of the month effect in 20 Countries using Periodic Generalized Autoregressive Conditional Heteroscedasticity (PGARCH) model. The aim of the research was to confirm the existence of turn of the month seasonal anomaly usually

reported in the Global markets like the America, Australia, Europe and Asian. The findings showed presence of turn of the month effect in 19 out of 20 Countries.

Locally, Mulumbi (2010) investigated the existence of the turn of the month effect at the Nairobi Securities Exchange. He used descriptive survey, regression and correlation in the data analysis. The findings confirmed the existence of the turn of the month effect at the NSE as the coefficient of determination for the Companies listed at the NSE was greater than 90%.

Ondiala (2014) looked at the turn of the month effect at the NSE for a period of 5 years from 2009 to 2013. Paired t – test was adopted to analyse data. The research established that many segments of the NSE did not pronounce turn of the month effect.

Musimbi (2015) studied the Turn of the Month effect on stock returns at the NSE using a different window of 3,5 and 8 days to the turn of the month for a period of 5 years. They used OLS regression and t-test and f-test for the differences in mean. The study showed the existence of the turn of the month anomaly between periods and study window with 5days turn on the month showing the most significant results.

2.3.3 Holiday effect on stock market return

Different investigations have been done to clarify holiday impact anomaly both in different financial exchanges globally and locally. In the global market, Chancharat et al. (2018) examined the unpredictability of the holiday effect in Thailand Stock Market. The paper looked at both pre-holiday and post-holiday effect in the Thai financial exchange. GARCH (1,1) Model and EGARCH (1,1) factual models were utilized. The outcomes demonstrated that there is a measurably huge positive better yield rate in both pre-occasion and post-occasion than in typical days. They likewise inferred that EGARCH (1,1) is more proper than GARCH (1,1).

Basaran et al. (2018) inquired about the Impact of Calendar anomalies on stock return and volatility; proof from the Turkish securities exchange. The goal of the examination was to decide the impacts of a day of the week, January impact and strict days on the profits and instability of the securities exchange in Turkey. The approach utilized in information investigation was OLS, Augmentin Dicky Fuller Test and GARCH. They discovered that the day of the week, January impact and Ramadan impact don't influence profits and instability for both the ordinary and capricious stock lists. The holy Ramadhan month doesn't

have any effect on both the profits of ordinary and Islamic records. The outcomes have reinforced the suspicion that the Turkish market is progressively productive and in accordance with Fama's EMH and that planning doesn't significantly affect the methodologies of Turkish financial specialists.

Dodd and Gakhovich (2012) studied the holiday effect in Central and Eastern European financial markets. They used the non-parametric test and dummy variation regression model to test the pre-and post-holiday effect. The study confirmed the presence of significant positive pre- and post-holiday returns.

Har and Chir (2016) looked at the effect of Holiday effect on the Malaysian stock exchange for a period of 10 years (between 2001 and 2010). The data was analysed using the ordinary least square from Bursa Malaysian main index. The findings showed that the returns during Christmas and Chinese New year period were significantly higher while the others holidays were insignificant. The lower returns during Islamic holidays such as Aidilfitri could be due to the lower participation by the Muslims in the stock markets.

Dumitrius, Stefanescu and Nistor (2011) investigated the holiday effect on the Romanian Stock Market. The objective of the study was to look at the presence of both pre and post-holiday effect at the Bucharest Stock Exchange. They adopted Ordinary Least Square methodology in the data analysis some of the main indices the Bucharest Stock Exchange. Dummy variables were used on the daily values of the indices. The findings recorded a post-holiday effects for all of the six main indices at Bucharest Stock Exchange and pre-holiday was recorded for others.

Alagidede (2013) examined the period of the year and pre-holiday effects in African Stock Market in African Stock returns; the month of the year and pre-holiday effects, and their suggestions for securities exchange proficiency. They utilized the customary way to deal with model inconsistencies and inspect the mean and fluctuation returns. They watched high and significant returns in days going before a vacation in South Africa. The outcomes demonstrate that the long stretch of the year impact is available in African Stock returns. It was anyway contended that inferable from illiquidity and full circle exchange cost, the anomalies revealed don't really disregard the no-exchange condition.

Omar (2015) researched the holiday impact at the NSE. The target of the examination was to determine the presence of pre-holiday at the NSE, the presence of post-holiday impact at

the NSE and aberrations between the pre and post-holiday anomalies returns at the NSE. Regression analysis methodology was used on the returns of the Companies. The investigation affirmed the presence of the pre-holiday impact at the NSE.

Hemed (2015) tested the presence of the pre-holiday impact on stock returns at the Nairobi Securities Exchange. The goal of the examination was to test the pre-occasion impact on financial exchange returns at the Nairobi Securities Exchange. The examination adopted descriptive research design. The discoveries showed the presence of the pre-holiday impact at the Nairobi Securities Exchange.

Ndonga (2014) discussed the holiday effect and stock market volatility at the Nairobi Securities Exchange. The main objective of the study was to analyze the relationship that exist between the holiday effects and the stock return volatility at the Nairobi Securities Exchange. Methodologies adopted was the descriptive statistics and the regression model. 40 Companies listed at the NSE were considered in the study the scope being from January to December 2013. The final results indicated the existence of the holiday effect at the NSE. The post holidays recorded highest mean returns while the lowest volatility was noted in pre-holiday returns.

2.3.4 Causes of Seasonal Stock Market Anomalies

Various explanations have been given as to the causes of seasonal market anomalies by various researchers. In this section we discussed three of the possible causes which might have resulted to the weekend effect, turn of the month effect and holiday effect they include; measurement error, Information asymmetry, behavioral impact among others.

2.3.4.1 Measurement error

Previous studies conducted have argued that seasonal effects occurrence may be as a result of statistical tool and model applied. Connolly (1989) analyzed the robustness of the Day of the Week effect and weekend effect to alternative estimation and testing procedures. The outcome presented that the strength of the Day of the Week and Weekend effect evidence appears to depend of the estimation and testing method used. Keim and Staught (1984) said that most of the empirical research done documented similar outcome as a result of data snooping from the previous studies done on financial anomalies. Charles (2013) studied the day of the week effect on volatility majoring on the role of asymmetry. He explored the

observational effect in five significant global records; France, Germany, United States, United Kingdom and Japan securities exchanges. Outcomes varied for each model utilized henceforth, they reasoned that the decision of a model ought to be considered as a factor that impacts the day of the week.

2.3.4.2 Behavioural effect

Speculators and investors behaviour is believed to have contributed to the fall and rise of stock market returns. Empirical research has shown that when selecting a portfolio, investors not only consider statistical measures like risk and return but also psychological factors such as emotion, pessimism, optimism and over reaction (Natalia ,2009). According to Benson and Ryston (1989), weekend effect is as a result of psychological effects. People tend to spend more on Fridays hence the rise of stock prices on Fridays and less on Mondays hence less returns on Mondays. Latif et al.(2011) in its study augured that turn of the month effect is due to mental behaviour, where investors sell their stock at the end of the month with expectation that listed Companies will release new information at the start of the month hence repurchase them again with hope of maximizing return. Chen and Singal (2003) also argued that speculative short sales contribute to the weekend effect. Most stock markets operate from Monday to Friday forcing most short sellers to close their speculative position on Fridays and reintroduce short positions on Monday causing stock price to rise on Friday and fall on Monday same is replicated on holiday effects. Visileious (2015) gave a contrary finding by saying that seasonal anomalies are to the large extend influenced by financial trends as investors psychology is controlled by business cycle and their behaviour change is influenced by the market performance.

2.3.4.3 Information Asymmetry

The timing of giving out information concerning a particular stock matters to investors and speculators influences stock returns. It is believed that most Companies deliver bad news on Fridays and good news on Mondays hence the panic selling of stocks by investors on Friday, leading to high stock returns on Fridays compared to Mondays (Rystron & Benson,1989).

2.4 Research gap

The existing literature shows that the effects of seasonal stock market anomalies on stock markets across the world have generated varying results;(Sawitri&Astuty,2018); (Odago,2016);(Shama et al.,2016); (Ndako,2013), (Kuria & Riro,2013), (Dash et al.,2011); (Nageswari &Selvam,2011),(Poterba et al.,2001), among others. stock market players like speculators and investors have therefore, found it difficult to make decision by relying on the seasonal market anomalies in isolation.

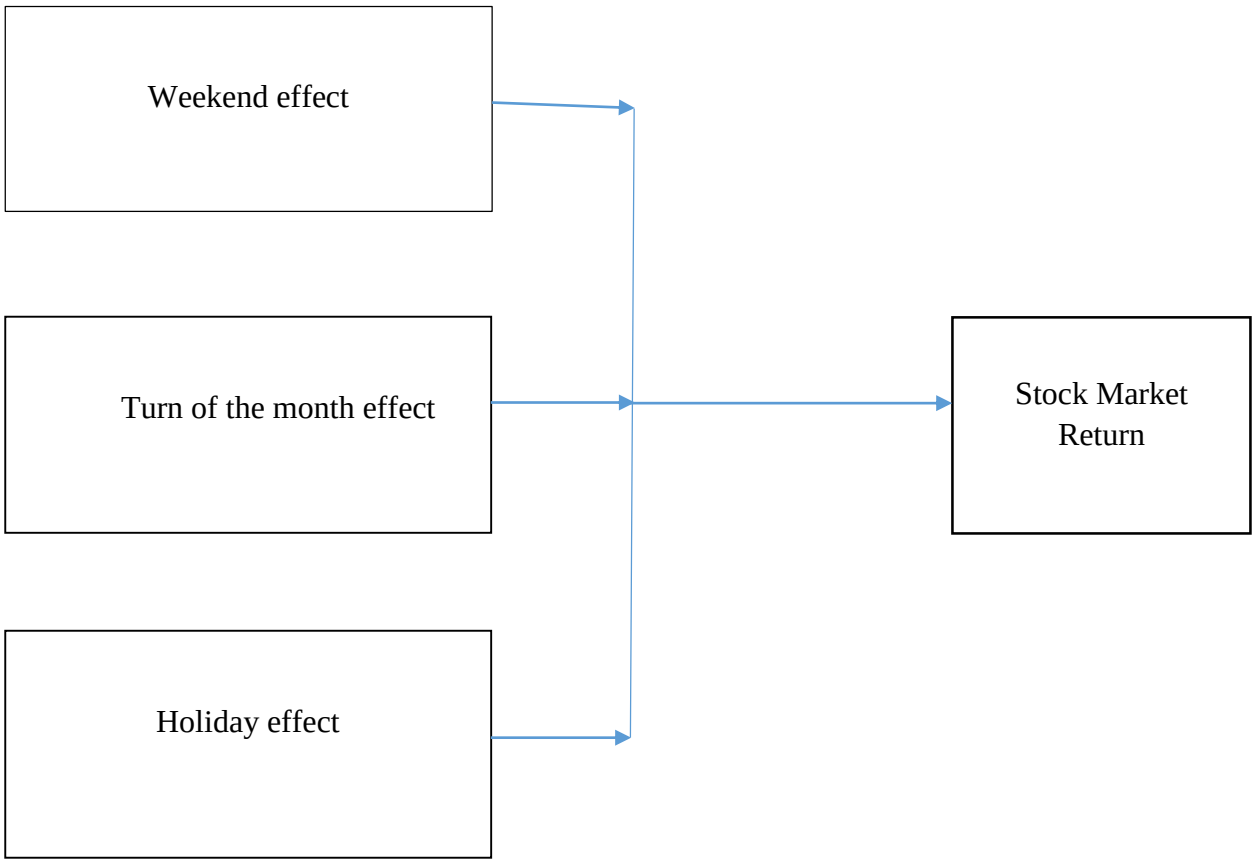
The literature review has also revealed that most studies done have concentrated on developed economies hence the findings might be limited to such economies and not developing economies. Studies done on Nairobi Securities exchange have focused on seasonal anomalies like on the January effect, day of the week effect, month of the year effect (Owido et al.,2017), (Osoro,2016), (Kiigi,2017), (Ondiala,2014) and (Onyuma,2009) and (Kuria &Riro,2013) leaving out other important calendar anomalies like the holiday effect and turn of the month effect. Studies that have looked at seasonal market anomalies effects at Nairobi Security exchange have not explored all the extension of GARCH (1,1) model such as EGARCH. Wakarindi (2015) and Odago (2016) examined the effect of calendar anomalies on stock return and volatility using OLS, GARCH and TGARCH respectively. They looked at two anomalies; Day of the week effect and Month of the year anomaly. They all concluded that there is presence of the day of the week effect and January effect at the NSE. The studies done locally have not looked at the turn of the month effect and holiday effect using asymmetric EGARCH model hence this study sort to fill the gap and add knowledge on conditional variance modelling.

2.5 Conceptual Framework

The study investigated the effect of seasonal stock market anomalies on stock return volatility among companies listed at the Nairobi Securities Exchange. The figure below shows the relationship between the independent variables: Weekend effect, turn of the month effect and Holiday effect and dependent variable -Stock Market return.

FIGURE 2. 1 – Conceptual Framework

Independent Variable **Dependent Variable**



Source : Author 2020

2.6 Operationalization of variables

TABLE 2. 1: Operationalization of variables

Category	**Variable**	**Indicator**	**Measurement**
Independent Variable	Weekend Effect	% Increase or decrease	Average mean return of NSE 20 share Index for each day of the week compared to the rest of the days
	Turn of the month effect	% Increase or decrease	Average mean return of the NSE 20 share Index last trading day of the month and the first three days of the next month (interval -1, +3) compared to average return of the rest of the days of the month
	Holiday effect	% Increase or decrease	Average mean return of NSE 20 share Index five days just before a holiday and the three days just after the holiday (Interval -5, +3) compared to mean return of non-holiday days in the month.
Dependent Variable	Stock Market Return	% Increase or decrease	Closing price of the NSE 20 Share Index at time t (Pt) - Closing price of the NSE 20 Share Index at time t-1(P_{1-t}) / Closing price of the NSE 20 Share Index at time t-1(P_{1-t}) * 100 **$Rt = (Pt - P_{t-1}/P_{t-1}) *100$**

Source: Author 2020

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology used to investigate the research questions /hypothesis. This section contains the research design, target population, data collection and data analysis.

3.2 Research design

The study adopted a descriptive research design to determine effects of seasonal market anomalies on stock market return and volatility among Companies listed at the NSE. Gill and Johnson (2006) expressed that descriptive research design is concerned essentially with tending to the specific attributes of a particular populace of subjects at either fixed point in time or at different occasions for similar purposes. It's optimal as it permits assortment of a lot of historical information from the NSE. The descriptive statistical analysis helped in understating the behaviour of each of the variables as it gave the mean, variance, maximum, minimum, skewness and kurtosis of the average mean return of each of the independent variable.

3.3 Population of the study

A population is the total number of items used in the study to inform the study variables (Osoro et al., 2015). The population of interest for this study shall be NSE 20 - Share Index from September 2000 to December 2019. The Companies currently listed in the NSE-20 Share index are listed in Appendix 1. NSE 20-Share Index is the average price-weighted index calculated as a mean of the top 20 best performing counters. The index is of interest as it’s the major indices at the NSE hence most looked up to by investors.

3.4 Data Collection

All the data gathered for this examination was secondary data from the NSE database. We recorded the closing stock prices of the NSE 20- Share Index which is the average price weighted index calculated as a mean of the top 20 best performing counters. We looked at a total of 4824 daily observations minus weekends and public holidays, public holidays. For the turn of the month we had 460 observations and 266 observations for holiday effect. All the data collected were first analysed in an excel spreadsheet, cleaned and uploaded to the

Stata software version 12.0 to generate inferential statistics necessary for determining the relationship between the study variables.

3.5 Data Analysis

The behaviour of the data was tested using descriptive statistics method. Exponential Generalized Auto-Regressive Conditional Heteroskedasticity Model (EGARCH) model was applied to capture the seasonality in returns.

Stock market return was computed as below:

$Rt = (P_t - P_{t-1})/P_{t-1}) *100$

Where Rt is the stock market return

Pt – Closing price of the NSE 20 Share Index at time t

Pt – Closing price of the NSE 20 Share Index at time t-1

3.5.1 Descriptive Statistics

The statistics included the summary of the observation which captured the mean, median, maximum value, minimum value, skewness and kurtosis for the returns of the entire period.

3.5.2 Time Series Analysis

Volatility model was developed to capture special features of the financial time series data such as, time varying volatility, volatility clustering, excess kurtosis, heavy tailed distribution and leverage effect (Eagle,1982).

3.5.2.1 Exponential generalized Autoregressive Conditional Heteroskedasticity (EGARCH)

The EGARCH was used in the analysis. EGARCH (1,1) was introduced by Nelson (1991) to solve weakness of GARCH (1,1) Model. He showed that EGARCH model give more accurate results compared to GARCH (1,1) Model. Engle and Bollesleve (1986) noted that GARCH models had weaknesses which included lack of asymmetry in response to shocks since it gives the same weight to the negative and positive shocks and difficulty in measuring persistence in GARCH models. The GARCH model also have non-negativity restrictions on the parameters (Wakarindi ,2015).

Nelson (1991) showed that EGARCH did not require condition of non- negativity constrains and that it allows for asymmetric effect between positive and negative assets returns.

Therefore, EGARCH (1,1) model was appropriate as it accounts for leverage effect; the fact that negative shocks lead to a higher rise in volatility than positive shocks of the same magnitude. This response normally shows the magnitude of response of the investors and speculators to market news.

The Mean and conditional variance of EGARCH(p, q) model is specified generally as;

Mean equation

Rt = μ +εt …….(1)

Variance equation

$$\log(\sigma_t^2) = \alpha_0 + \sum_{i=1}^{p} \alpha_i \left|\frac{y_{t-i}}{\sigma_{t-i}}\right| + \gamma_i \left(\frac{y_{t-i}}{\sigma_{t-i}}\right) + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) \quad \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

Where γ is the asymmetric response parameter that can take either a positive or negative sign depending on the effect of the future uncertainty, for a positive shock $\left(\frac{y_{t-1}}{\sigma_{t-1}}\right) > 0$, then E-GARCH (1, 1) becomes;

$$\log(\sigma_t^2) = \alpha_0 + (\alpha_1 + \gamma_1)\left(\frac{y_{t-1}}{\sigma_{t-1}}\right) + \beta_1 \log(\sigma_{t-1}^2) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3)$$

For negative shocks, $\left(\frac{y_{t-i}}{\sigma_{t-i}}\right) < 0$ it implies that bad news would have higher impact on volatility and the E-GARCH (1, 1) becomes

$$\log(\sigma_t^2) = \alpha_0 + (\alpha_1 - \gamma_1)\left(\frac{y_{t-1}}{\sigma_{t-1}}\right) + \beta_1 \log(\sigma_{t-1}^2) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Model specification

We carried out diagnostic test on the data before fitting the model. The data was tested for normality using Shapiro-Wilk normality test, Arch Effect using Ljung Box test, stationarity test using Augmented Dickey - Fuller Test (ADF Test) and Serial Correlation using Breusch-Godfrey LM test for autocorrelation. The data was expected to pass all this test before modelling. AIC and BIC criteria are commonly used to select suitable models. In this study, EGARCH (1,1) model was selected to test the weekend effect, turn of the month effect and the holiday effect. The EGARCH Model has been found to be appropriate model for financial time serious data where the data is volatile in nature by previous researchers such as; (Caporale & Zikirova ,2017), (Opondo ,2015), (Ndako & Bida ,2013) and (Chia et al.,

2006). To analyse the weekend effect, turn of the month effect and holiday effect using EGARCH model, dummy variables was introduced into the model.

For this study the EGARCH (1,1) model equation was as shown below.

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-i}}\right| + y\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) + \beta_1 \log(\sigma_{t-1}^2) \text{ .... (5)}$$

Where: $\log(\sigma_t^2)$ is the logarithm of the conditional variance.

ω, α, y &β are constant parameters to be estimated

α is the ARCH term that measures the magnitude of the shocks of the news about volatility

β is the GARCH term. It captures the persistence in the conditional variance

y captures the asymmetries; if negative shocks are followed by higher volatility, then the estimate of y will be negative.y > 0,Indicates positive news while y <0 indicates bad news.

a. Weekend Effect

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-i}}\right| + y\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) + \beta_1 \log(\sigma_{t-1}^2) + \delta 1D \text{ ....(6)}$$

For the weekend effect equation (6) above was adopted. D is a dummy variable equal to j if is trading day and zero otherwise where (j=1,2,3,4&5), j=1 for Monday, 2 for Tuesday,3 for Wednesday,4 for Thursday and 5 for Friday.

b. Turn of the Month Effect

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-i}}\right| + y\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) + \beta_1 \log(\sigma_{t-1}^2) + \delta 1DTOM + \delta 1DNTOM \text{..........(7)}$$

For the turn of the month effect equation (7) above was adopted. DTOM is a dummy variable equal to 1 for mean returns belonging to TOM interval (-1,+3) and 0 otherwise, while DNTOM is a dummy variable obtaining value 1 for mean returns not belonging to NTOM interval and 0 otherwise .

c. Holiday Effect

$$\log(\sigma_t^2) = \omega + \alpha \left|\frac{\varepsilon_{t-1}}{\sigma_{t-i}}\right| + y\left(\frac{\varepsilon_{t-i}}{\sigma_{t-i}}\right) + \beta_1 \log(\sigma_{t-1}^2) + \delta 1DHE \text{ ....(8)}$$

Equation (8) was adopted for Holiday effect. DHE is a dummy variable equal to 1 for mean return belonging to Holiday interval (-5, +3) and 0 otherwise, DNHE is a dummy variable obtaining value 1 for mean returns Non- Holidays (NHE) and 0 otherwise.

3.7 Diagnostic test

The diagnostic test was carried out before the data analysis process since the research is utilizing time-series information, the error of fluctuation conditions is regularly discovered. The diagnostic test carried out were; normality test, ARCH effect test, stationarity test and auto-correlation test.

3.7.1 Normality test

Financial time series data exhibit excess kurtosis and are skewed. Normality test checks whether the residuals are normally distributed where the hypotheses are;

$H_0: Returns\ are\ normally\ distributed$

$H_1: Returns\ are\ not\ normally\ distributed$

The univariate normality of variable is said to exist if kurtosis statistic falling between (-10.0, 10.0) and skewness statistic is within (-3.0, 3.0).

The Jarque Bera (JB) test for normality is commonly used and the test statistic for JB is;

$$JB = \left(\frac{S}{\sqrt{\frac{6}{T}}}\right)^2 + \left(\frac{K-3}{\sqrt{\frac{24}{T}}}\right)^2$$

Where K is the sample kurtosis,S is the computed sample skewness and T is the total number of observations. Under the null hypothesis, the test statistic follows chi-square distribution with 2 degrees of freedom. The null hypothesis is rejected for the large values of JB.

In this research Shapiro Will test for normality was used in the analysis.

3.7.2 ARCH Effect Test

The Ljung Box test is a diagnostic tool used to test the ARCH effects. This test is used to find out whether the standardized residuals show ARCH behaviour. The test checks m autocorrelations of the residuals.

The Ljung Box test hypotheses are;

$H_0: No\ ARCH\ effects$

$H_1: Presence\ of\ ARCH\ effects$

The Ljung Box test statistic is defined as;

$$Q = n(n+2)\sum_{k=1}^{m}\frac{\hat{r}_k^2}{n-k}$$

Where $\hat{r}_k$ is the estimated autocorrelation of the series at lag k and m is the number of lags being tested.The null hypothesis of the Ljung Box test is rejected for greater values of chi-square distribution with h degrees of freedom at a level of significance α. The degrees of freedom must account for the estimated model parameters so that $h = m - p - q$, where p and q indicate the number of parameters from the ARCH or GARCH model fit to the data.

3.7.3 Stationarity test

A stationarity time series is one whose properties such as mean and variance are all constant over time. Stationarity of the returns was done using Augmented Dickey Fuller test which assumes that the returns r_t is a random walk process with a drift such that $r_t = \emptyset_0 + \emptyset_1 r_{t-1} + \varepsilon_t$ where ε_t is a white noise process. The hypotheses are;

$H_0: \emptyset = 1$

$H_1: \emptyset < 1$

The ADF test statistic is given by;

$$ADF = \frac{\hat{\emptyset}-1}{s.e(\emptyset)}$$

Where $\hat{\emptyset} = \frac{\sum_{t=1}^{T} r_{t-1} r_t}{\sum_{t=1}^{T} r_{t-1}^2}$

For the ADF test, the null hypothesis is rejected for p-values less than the levels of significance α whereby the conclusion will be that the returns are stationary.

3.7.4 Auto-correlation Test

It is an assumption of regression analysis where the residuals would not correlate with anything else, including each other at different times (Kiigu,2017). Durbin's alternative test was used to detect the serial auto-correlation.

Null Hypothesis: There is no serial correlation

Alternative Hypothesis: There is serial correlation

Decision rule; at the point when the p-value is more than 0.05, we fail to reject the null hypothesis and conclude that there is no serial correlation on the residuals.

CHAPTER FOUR

ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

In this chapter, the study presents result of the data analysis and the findings. The study begins by giving descriptive statistics of the data and time series analysis using EGARCH (1,1) models.

4.2 Weekend Effect Analysis

4.2.1 Descriptive Statistics

Table 4.1 give the mean, maximum, minimum, standard deviation, skewness and kurtosis for weekend effect for NSE 20 Share Index.

TABLE 4. 1: Descriptive Statistics of NSE 20 Share Index return of the weekend effect

Day of the week	Mean	Count	Max	Min	Std Deviation	Skewness	Kurtosis
	%		%	%	%	%	%
Monday	0.0001501	4822	9.01817	-3.141984	0.3664239	5.44536	123.4446
Tuesday	-0.003964	4817	5.55704	-8.242557	0.3908315	-1.279412	82.49833
Wednesday	0.0021481	4817	7.194616	-5.09933	0.3716803	0.9968548	67.22518
Thursday	-0.0011311	4824	4.757346	-4.416257	0.3474842	0.1059138	41.60104
Friday	0.0116865	4821	6.649682	-3.713791	0.3655151	2.185826	66.5378
All days	0.0089502	4824	0.0089502	-8.242557	0.8244827	0.6013403	15.62403

Source: Author 2020

Table 4.1 summarised information on the NSE 20 Share Index daily return from 5 September 2000 to December 2019. There were 4824 daily observations for the weekend effect. It was observed that the daily mean return for the NSE 20 share index for all days of the week was 0.0089502% with a standard deviation (volatility) of 0.8244827, skewness of 0.6013403 and kurtosis of 15.62403 thus rejecting normality of the data in the study period. The stock returns show excess kurtosis >3 indicating that they are leptokurtic.

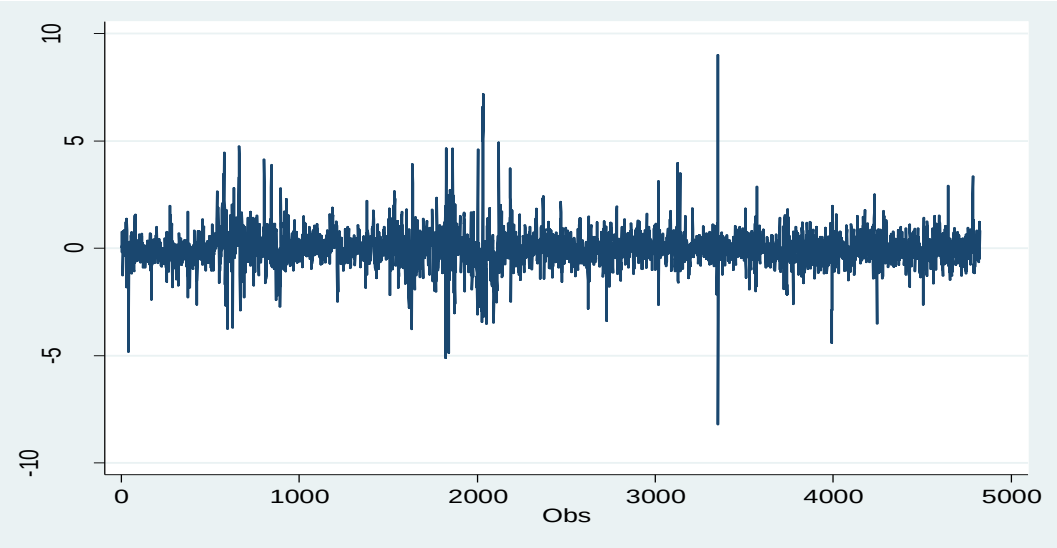
Analysing the return for each day of the week, Friday recorded the highest mean return of 0.0116865% while Tuesday had the lowest mean return of -0.003964. The minimum index for Monday, Tuesday, Wednesday, Thursday and Friday was -3.141984%, -8.242557%, -5.09933%, -4.416257% and -3.713791 %. Tuesday had the lowest index among the minimum index in all the days of the week. The maximum index for Monday, Tuesday,

Wednesday, Thursday and Friday was 9.01817%, 5.55704%, 7.194616% ,4.757346%, 4.757346% and 6.649682 %. Monday recorded the highest maximum index. All the days of the week recorded positively skewed results except for Tuesday which is negatively skewed and excess kurtosis is observed in all the days of the week of the NSE 20 share index returns. The highest volatility (Standard deviation) of 0.3908315% is observed on Tuesday with Thursday recording the lowest volatility of 0.3474842%. This may temporarily show that the weekend effect does not affect the stock market return of the NSE 20 Share Index. This finding was inconsistent with the previous studies at the Nairobi Securities Exchange by (Oyori ,2011).

4.2.2 Volatility Clustering for the Weekend effect

Daily NSE 20 Share index from Sept 2000 to December 2019

FIGURE 4. 1: Time Series plot for weekend effect



Source: Author 2020

From figure 4.1 of time series plot above, we observed volatility clustering of the daily stock returns. Periods of high volatility are followed by periods of high volatility and periods of low volatility are followed by periods of low volatility. A spike was witnessed between observation 1800 and again 3125. A return of up to Kshs.190 was witnessed in a day. The high volatility seen in the time series plot allows for the application of the GARCH family model. In this case, EGARCH is used as it appreciates the conditional variance variation and the asymmetric effect.

4.2.3 Ordinary Least Square (OLS) Regression analysis on Weekend Effect

TABLE 4. 2 : OLS Model results for weekend effect

Number of Obs = 4824		F (4,4819) = 1.30		Prob > 0.2689	
R-Squared = 0.0011		Adj R-Squared = 0.0002		Root MSE = 0.82143	
Stock Returns	Coef.	Std.Err	T	P>/t/	95% Conf. Interval
D1	-0.0577044	0.03774	-1.53	0.126	-0.1316922 0.0162833
D2	-0.0789908	0.0373891	-2.11	0.035	-0.1522905 -0.0056911
D3	-0.045195	0.037408	-1.21	0.227	-0.1185318 0.0281417
D4	-0.0649199	0.3741175	-1.74	0.083	-0.1382752 0.0084354
Cons	0.0591952	0.0266087	2.22	0.026	0.00703 0.1113603

Source: Author 2020

Null Hypothesis: Model Significant

Alternative Hypothesis: Model not significant

The p=0.2689 >0.05 hence we reject the null hypothesis and conclude that the model is not significant in explaining the weekend effect of the stock market return at the NSE.

Analysing the weekend effect OLS Model, table 4.2 showed Monday, Wednesday, Thursday are statistically insignificant, thus fails to confirm the Monday effect on the NSE 20 share index at the Nairobi Securities Exchange. Tuesday recorded the most negative but significant, confirming Tuesday effect. Friday showed a positive coefficient and significant confirming Friday effect of the NSE 20 share index stock returns at the NSE. This shows that investors at the Nairobi Securities Exchange are able to rely on market timing when trading on shares.

4.2.4 Testing for stationarity

TABLE 4. 3: Augmented Dicker-Fuller test results – Daily returns(OLS)

	Test Statistics	1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-34.415	-3.430	-2.860	-2.570
MacKinnon approximate p-value Z(t) = 0.0000				

Source : Author 2020

Null Hypothesis: Daily Stock Returns are not stationery

Alternative Hypothesis: Daily Stock returns are stationery

From the table 4.3, the p value of the Augmented Dickey – Fuller test is 0.000 < 0.05 we reject the null hypothesis and take alternative hypothesis, and conclude that the returns are stationery hence desirable.

4.2.5 Testing for serial correlation

TABLE 4. 4: Serial Correlation results- Weekend effect

Lags (p)	Chi2	Df	Prob > chi2
1	651.393	1	0.061

Source: Author 2020

Breusch-Godfrey LM test for autocorrelation

Null Hypothesis: There is no serial correlation

Alternative Hypothesis: There is serial correlation

From table 4.4, the p-vales is 0.061 greater (>) than 0.05 , we fail to reject the null hypothesis. Implying there is no serial correlation on the residuals. This is desirable.

4.2.6 Testing for Normality

TABLE 4. 5:Normality test on weekend effect

Variable	**Obs**	**w**	**v**	**z**	**Prob>z**
R	**4824**	**0.89327**	**280.109**	**14.769**	**0.2510**

Source: Author 2020

Shapiro Wilk Test for normal data

Null Hypothesis: Residuals are normally distributed

Null Hypothesis: Residuals are not normally distributed

From the model, p = 0.2510 which is greater than 0.05. We reject the null hypothesis and conclude that the residuals are not normally distributed. This is not desirable.

4.2.7 Testing for ARCH Effect

TABLE 4. 6: Arch Effect on Weekend effect

Lags (p)	Chi2	Df	Prob > chi2
1	1096.212	1	0.0000

LM test for autoregressive conditional heteroscedasticity (ARCH)

Source: Author 2020

Null Hypothesis: no ARCH effects

Alternative Hypothesis: ARCH(p) disturbance

The probability is 0.0000 less (<) than 0.05, the null hypothesis is rejected, and accept Alternative Hypothesis implying ARCH effect is present hence conditional variance is not constant. This is not desirable.

The results of the diagnostic test conducted on the OLS model to determine its reliability, fall short. The residuals are stationery although it has ARCH disturbance thus the need to use the EGARCH Model.

4.2.8 EGARCH on the Weekend Effect

TABLE 4. 7 EGARCH : Weekend Effect

ARCH family regression

Sample: 1 - 4824
Log likelihood = -5043.009 Prob > chi2 = 0.0003
Wald chi2(4) = 21.38

	Day of the week	**Coefficients**	**Std Err**	**Z**	**p>/z/**	**(95% Conf.Interval)**
Mean Equation						
	Monday	-0.101287	0.0257173	-3.94	0.000	-0.1516919 -0.50882
	Tuesday	-0.0898868	0.0220958	-4.07	0.000	-0.1331937 -0.0465799
	Wednesday	-0.0622022	0.0240877	-2.58	0.010	-0.1094132 -0.0149912
	Thursday	-0.0576976	0.0241146	-2.39	0.017	-0.1049614 -0.0104339
	Cons.	0.0689459	0.0169215	4.07	0.000	0.0357804 0.102114
Variance Equation ω, α, y &β						
	ω (constant)	-0.0371593	0.0038750	-9.59	0.000	-0.0447556 -0.029563
	α	-0.0065516	0.007337	0.89	0.372	-0.00772886 0.0210265
	y	0.9188732	0.004901	184.14	0.000	0.9090927 0.9286537

	β	0.3857238	0.012569	30.69	0.000	0.361089	0.4103585

Source: Author 2020

In the mean equation, Monday's recorded the lowest coefficient of -0.101287 which is statistically significant (0.000 <0.05), confirming the presence of Monday Effect. Friday has the highest coefficient of 0.0689459 which is also statistically significant (0.000< 0.05). This implies that weekend effect influences the stock returns with Mondays recording lowest returns and Fridays record highest returns. This finding is consistent with previous studies at the Nairobi Securities Exchange by (Opondo,2015; Odago,2016) and other global studies done by (Ariss, 2011) and (Nageswari et al.,2011).

The conditional variance equation, the Arch (α) is not significant while the Garch (β) is significant meaning previous days volatility can influence the volatility of today's stock return .The leverage effect (y) is positive with significant p-value confirming positive shocks (good news).Thus no leverage effect. The positive asymmetric term implies that positive shocks have greater impact on volatility more than negative shocks of the same magnitude.

4.2.9 Post diagnostic tests on the EGARCH Model

TABLE 4. 8 : Serial correlation of post diagnostic test on Weekend Effect

						-1 0 1
LAG	AC	PAC	Q	Prob>Q	AC	[Partial Autocor]
1	0.3669	0.367	1.6498	0.2893	1	1
2	-0.2433	-0.1255	1.9356	0.5402	1	1
3	-0.1193	-0.0057	2.1004	0.6476	1	1
4	-0.0327	-0.0406	2.1011	0.6306	1	1
5	-0.0055	-0.009	4.0101	0.746	1	1
6	-0.0152	-0.0115	4.1011	0.6633	1	1
7	-0.0181	-0.0052	5.1012	0.7104	1	1
8	-0.008	-0.0069	5.1013	0.7981	1	1
9	-0.0216	-0.0326	6.1015	0.7724	1	1
10	-0.0188	-0.0038	6.1017	0.7993	1	1
11	-0.0288	-0.0132	7.1021	0.847	1	1
12	-0.0188	-0.0021	7.1022	0.8683	1	1
13	-0.0285	*0.0181	8.1026	0.8852	1	1

14	-0.0341	0.0193	8.1032	0.8693	1	1
15	-0.0246	-0.0026	8.1035	0.9076	1	1

Source: Author 2020

Null Hypothesis: There is no serial correlation in the residual

Alt Hypothesis: There is a serial correlation

From the table above, the p-values are all greater than 0.05 we fail to reject the null hypothesis and conclude that there is no serial correlation hence we conclude that the model is a good fit. The Q-statistics values are greater than 0.05 indicating absence of the ARCH effect.

4.3 Turn of the Month Effect Analysis

In this study the Turn of the Month (TOM) effect is defined as the interval [-1, +3], where -1 is the last trading day of each month and continuing until the third trading day of the following month. This is compared with the return of the Non-Turn of the Month (NTOM).

4.3.1 Descriptive Statistics

TABLE 4. 9: Descriptive Statistics for turn of the month effect

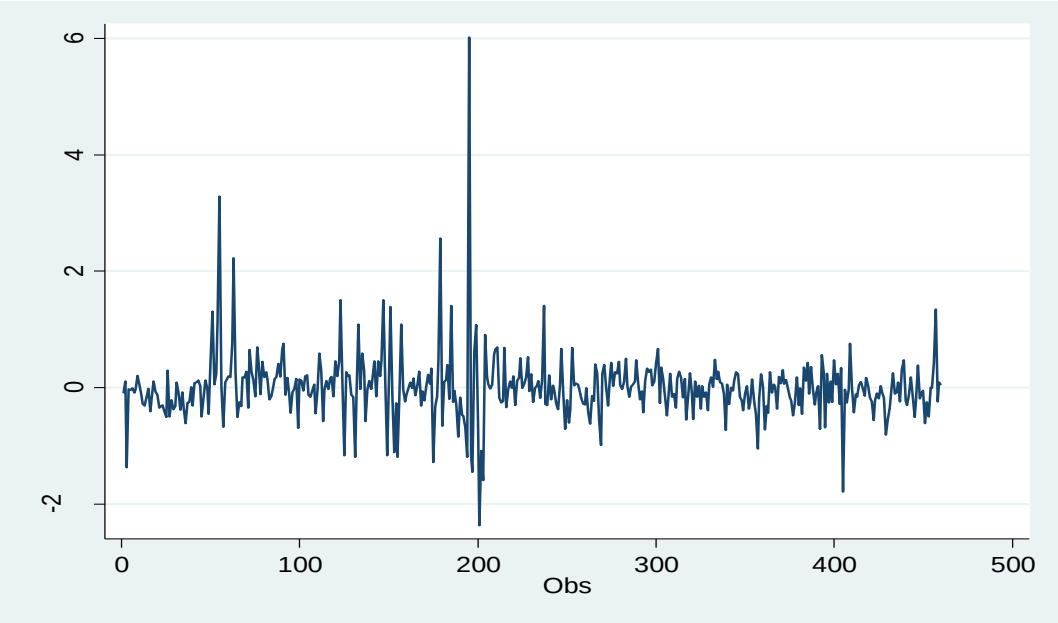
Turn of the Month	Obs	Mean	Max	Min	Std Deviation	Median	Skewness	Kurtosis
		%	%	%	%	%	%	%
TOM (-1,+3)	230	0.0865802	6.100685	-2.275954	0.738419	0.0350305	2.832702	23.53392
NTOM	230	0.084105	1.143802	-1.177079	0.3051591	0.0309964	-0.2632637	5.58485

Source : Author 2020

From table 4.92, the turn of the month (TOM -1, +3) recorded the highest mean stock returns of 0.0865802% while the mean stock return of the Non-Turn of the Month (NTOM) was 0.084105%. Turn of the month (TOM -1, +3) has the highest volatility of 0.738419% compared to the volatility of the Non-Turn of the Month (NTOM) of 0.3051591. We observed negative skewness in Non-turn of the month (NTOM) of -0.2632637% while turn of the month recorded a positive of 2.832702%. Turn of the month (TOM) and non-Turn of the Month (NTOM) recorded excess kurtosis of 23.53392% and 5.58485% respectively. The kurtosis >3 means they are leptokurtic. This temporarily show that turn of the month effect anomaly affects the stock return at the Nairobi Securities Exchange. This finding was consistent with the previous studies at the Nairobi Securities Exchange by (Ondiala ,2014).

4.3.2 Volatility Clustering

FIGURE 4. 2: Time plot for turn of the month effect



Source : Author 2020

From figure 4.3 it is observed that the stock returns of the turn of the month are volatile as high stock returns are followed by high stock returns and low stock return are followed by low stock returns of the same magnitude. Hence confirming volatile clustering of a time series data.

4.3.3 OLS Regression on Turn of the Month Effect

During the analysis dummy variables were introduced because the turn of the month effect (independent variable) is an exogenous variable. Where DTOM1 =1 or 0, otherwise, DNTOM=1 or 0 otherwise. DNTOM was eliminated to avoid dummy variable trap. TOM (-1, +3) refers to average stock return of last day of the month and the first three days of the following month, NTOM refers to the average stock return of the rest of the days of the month.

4.3.4 Ordinary Least Square Regression for the Turn of the Month Effect

TABLE 4. 10: OLS results for the turn of the month effect

Number of Obs = 460		F(2,23757) = 2.27		Prob > 0.1324	
R-Squared = 0.0049		Adj R-Squared = 0.0028		Root MSE = 0.56619	
Stock Returns	Coef.	Std.Err	T	P>/t/	95% Conf. Interval
DTOM (-1,+3)	0.0795788	0.0527972	1.51	0.132	-0.024176 0.1833336
Cons	0.0080831	0.0373332	0.22	0.829	-0.0652826 0.0814488

Source : Author 2020

Null Hypothesis: Model is useful

Alternative Hypothesis: Model is not useful

The P-value of the OLS model is 0.1324>0.05 we fail to reject the null hypothesis and conclude that the model is not useful in explaining the significance of the turn of the month effect of the NSE 20 share index at the NSE.

The results above show that the coefficients of the turn of the month (TOM -1, +3) and NTOM are positive but they are all insignificant in explaining that turn of the month effect of the NSE 20 Share Index at the Nairobi Securities Exchange.

4.3.5 Stationarity Test – Augmented Dickey –Fuller Test

TABLE 4. 11 :Augmented Dickey-Fuller test for unit root of turn of the month effect

	Test Statistics	1% Critical Value	5%Critical Value	10% Critical Value
z(t)	-20.411	-3.443	-2.872	-2.570

Source : Author 2020

Mackinnon approximate p-vale for –value z(t) = 0.00000

H0: Residuals are not stationery

H1: Residuals are stationery

From the table the p-value is 0.0000 less than 0.05, we reject the null hypothesis and conclude that the return is stationery which is desirable.

4.3.6 Test for autocorrelation

TABLE 4. 12: Test for autocorrelation on the turn of the month effect

Lags(p)	Chi2	Df	Prob> chi2
1	0.984	1	0.3213

Source: Author 2020

Breusch –Godfrey LM test for autocorrelation

Null hypothesis : No serial correlation on the residuals

Alternative hypothesis: Serial correlation on the residuals

From the table p value is 0.3213 greater than 0.005 we fail to reject the null hypothesis and conclude that the residuals have no serial correlation. This is desirable.

4.3.7 Test for normality of the turn of the month effect

TABLE 4. 13 :Shapiro –Wilk W test for normal data for Turn of the month effect

Variable	Obs	W	V	Z	Pro>chi2
R	460	0.76374	73.732	10.299	0.0000

Source: Author 2020

Null Hypothesis: Residuals are not normally distributed

Alternative Hypothesis: Residuals are normally distributed

From the table above the p-value is 0.000 less than 0.05, we accept the null hypothesis and reject the alternative hypothesis and conclude that the residuals are not normally distributed. This is not desirable.

4.3.8 Test for Arch Effect on the turn of the month

TABLE 4. 14 :LM test for autoregressive conditional heteroscedasticity (ARCH)

Lags	Chi2	df	Prob >chi2
1	7.878	2	0.0195

Source : Author 2020

Null Hypothesis: No ARCH effect

Alternative Hypothesis: ARCH(p) disturbance

From the results the p value is 0.0195 less (<) 0.05, we reject Null hypothesis (H0) and accept the alternate hypothesis (H1) conclude that there is ARCH disturbance in the model. This is not desirable.

The results of the diagnostic test conducted on the OLS model to determine its reliability fall short. The residuals have clustering volatility and have arch disturbance thus the need to run the EGARCH Model.

4.3.9 EGARCH for Turn of the month effect

TABLE 4. 15: EGARCH for Turn of the month effect

No. of Observation – 460
Wald chi2 (1) – 4.32
Prob > chi2 = 0.0376

	Turn of the Month	**Coefficients**	**Std Err**	**Z**	**p>/z/**	**(95%Conf.Interval)**
Mean Equation						
	TOM (-1,+3)	0.0568144	0.0273213	2.08	0.038	0.0032656 0.1103632
	Const	-0.0158174	0.231828	-0.68	0.495	-0.0612548 0.0296201
Variance Equation ω, α, y &β						
	ω (constant)	-0.5963635	0.1037401	-5.75	0.000	-0.7996904 0.3930365
	α	0.0411424	0.047407	0.87	0.385	-0.0517737 0.1340585
	y	0.5253292	0.0647788	8.11	0.000	0.3983651 0.6522932
	β	1.041139	0.0528154	19.71	0.000	0.9376225 1.144655

Source: Author 2020

In the mean return equations, the coefficient of the turn of the month is positive at 0.0568144% compared to coefficient of the non-turn of the month which is negative (-0.0158174%). The results of the turn of the month are statistically significantly different from the non-turn of the month at 5% level of the significance hence we conclude that turn of the month influences the stock return of the NSE 20 share index at the Nairobi Securities Exchange. This finding is consistent with the previous studies at Nairobi Securities Exchange by (Musimbi,2015);(Mulumbi,2010) and studies by ((Darrat,2015); (Giavoni,2014) in the global market respectively.

From the conditional variance equation, the Arch(α) is insignificant while the Garch (β) is significant meaning previous days volatility can influence the volatility of today's stock

return the leverage effect (y) has a positive coefficient (0.5253292) but significant p=0.000< 0.05. The positive leverage effect means that good news or shocks generate less volatility than bad news. Hence no leverage effect. When there is less volatility in the return them risk of the businesses goes up and investors are likely to shift their funds to less risk investments.

4.3.9.1 Post Diagnostic test on the EGARCH of the turn of the month effect

TABLE 4. 16: Serial correlation of post diagnostic test of TOM Effect

. corrgram GR, lags(15)						
				-1 0 1	-1 0 1	
LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial Autocor]
1	0.0458	0.0458	.97154	0.3243		
2	-0.1310	-0.1334	8.9319	0.1115	-	-
3	0.0092	0.0228	8.9715	0.1297		
4	0.0668	0.0490	11.051	0.1260		
5	0.0254	0.0242	11.351	0.1448		
6	-0.0470	-0.0360	12.384	0.0539		
7	-0.0083	0.0007	12.416	0.0877		
8	-0.0545	-0.0716	13.811	0.0868		
9	0.0582	0.0652	15.406	0.0804		
10	0.0696	0.0536	17.695	0.0603		
11	0.0139	0.0293	17.787	0.0867		
12	0.0634	0.0852	19.693	0.0731		
13	0.0628	0.0584	21.569	0.0624		
14	0.0128	0.0109	21.647	0.0862		
15	-0.0362	-0.0265	22.274	0.1008		
.						

Source: Author 2020

Null: There is no serial correlation in the residual

Alt: There is a serial correlation

From the table above, the p-values are all greater than 0.05 we fail to reject the null hypothesis and conclude that there is no serial correlation hence we conclude that the model is a good fit. The Q-statistics values are greater than 0.05 indicating absence of the ARCH effects.

4.4 Holiday Effect Analysis

In this study the Holiday Effect (HE) effect is defined as the interval [-5, +3], where -5 is the five trading day just before a public holiday and -3 is the first three days after a public holiday averaged and compared to the non- holidays in the month. We used seven holidays in a year namely New year, Easter Holiday we considered good Friday and Easter Monday as one, labour day, Madaraka day, Mashujaa Day, Jamhuri Day and Christmas and Boxing was combined to one.

4.4.1 Descriptive Statistics

Descriptive statistics analysis was conducted to define the characteristics of the average stock return holiday effect (interval -5, +3) and average stock return of the non- holidays. This is shown in **table 4.17.**

TABLE 4. 17: Descriptive Statistic for Holiday Effect

Turn of the Month	Obs	Mean	Max	Min	Std Deviation	Median	Skewness	Kurtosis
		%	%	%	%	%	%	%
Holiday Effect (-1,+3)	266	0.1121627	2.14249	0.0664968	0.4309565	0.0664968	0.811551	7.496408
Average return of non-holidays	266	0.0421543	0.8794846	0.0363811	0.2884744	0.0363811	0.1031976	3.993026

Source: Author 2020

The average mean return of the holiday effect is higher at 0.1121627% than the average of the non-holidays which was recorded at 0.0421543%. The maximum of the average Stock return of the holiday is 2.14249 % higher than the maximum of the average return of the non-holidays. The average return for the non-holidays is lower by 0.0363811% to average return of the holiday effect which was recorded as 0.0664968%. The volatility (Standard deviation) of the average return of stock return of the holiday is 0.4309565% which is higher than the volatility (Standard deviation) of the non-holidays at 0.2884744. This is a temporary indication of holiday effect of the stock return at the Nairobi Securities Exchange. The average stock returns for the holiday and the non-holidays show kurtosis of 7.496408% and 3.993026% respectively. Kurtosis which are above 3 indicate that that they are leptokurtic.

4.4.2 Volatility Clustering

FIGURE 4. 3: Time plots for holiday effect

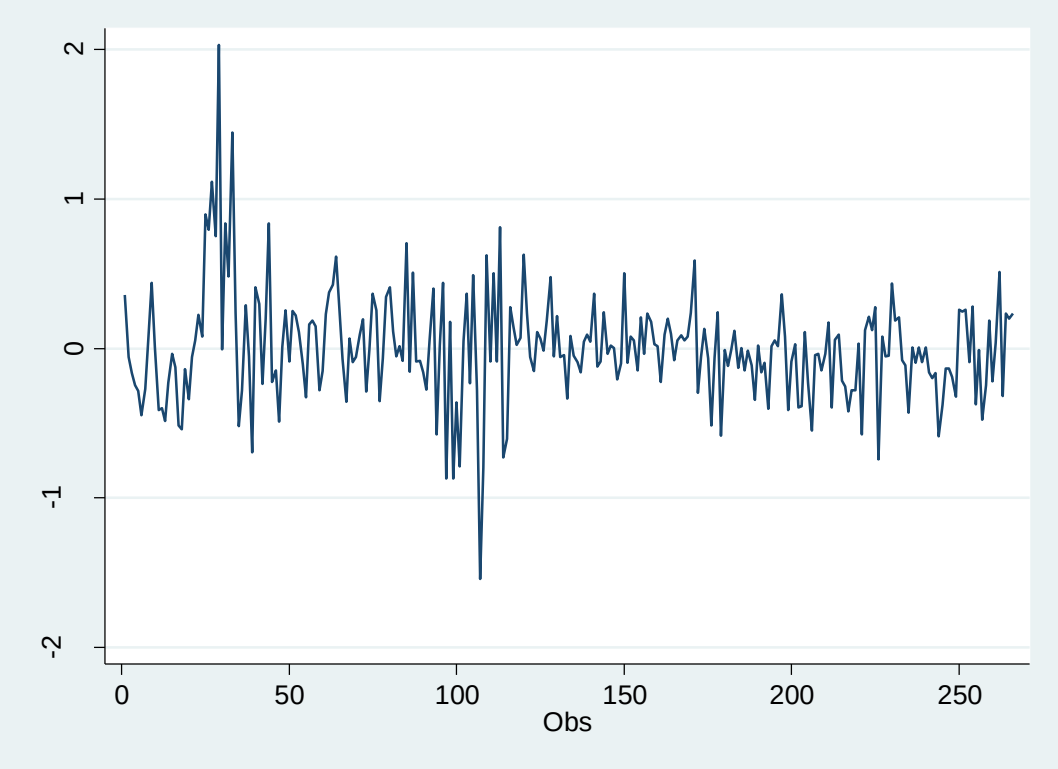


Figure 4.5 show that periods of high volatility are followed by periods of high volatility and periods of low volatility tend to be followed by periods of low volatility. The high volatility observed in the time series plot paves way for application of EGARCH Model which appreciate the conditional variance variation.

4.4.3 OLS on Holiday Effect

TABLE 4. 18 : OLS for Holiday effect

No. of obs = 266 F (1,264) = 2.42 Pro>F = 0.1207 R-Square = 0.0091				Adj R-square = 0.0053 Root MSE = 0.3667	
Stockreturn	Coeff	Std.Err	T	p>t	(95% Conf.Interval
DHE	0.0700084	0.0449679	1.56	0.121	-0.018533 0.585498
Cons	0.0421543	0.0317971	1.33	0.86	-0.0204539 0.1047625

Source : Author 2020

Null Hypothesis: The model is not useful

Alternative Hypothesis: The model is useful

The P value of the model is 0.1207 which is more than 0.05, we fail to reject the null hypothesis and conclude that the model is not useful in explaining the holiday effect anomaly of the NSE 20 share index return at the Nairobi Securities Exchange. The coefficient of the Holiday and non-holidays are all positive but are statistically insignificant in explaining the holidays effect anomaly of the NSE 20 Share Index at the Nairobi Securities Exchange.

4.4.4 Test for stationarity

TABLE 4. 19: Dickey-Fuller test for unit root for Holiday Effect

	Test Statistic	**1% Critical Value**	**5% Critical Value**	**10% Critical Value**
Z (t)	**-12.928**	**-3.459**	**-2.879**	**-2.570**
MacKinnon approximate p-value for Z (t) = 0.0000				

Source :Author 2020

H0: Residuals are not stationery

H1: Residuals are stationery

From the table the p-value is 0.0000 less than 0.05, we reject the null hypothesis and conclude that the return is stationery which is desirable.

4.4.5 Test for autocorrelation

Table 4. 20: Breusch –Godfrey LM test for autocorrelation for Holiday Effect

Lags(p)	Chi2	Df	Prob> chi2
1	13.37	1	0.0703

Source :Author 2020

Null hypothesis : No serial correlation on the residuals

Alternative hypothesis: Serial correlation on th residuals

From the table 4.2.2, the p value is 0.0703 greater than 0.05, we fail to reject the null hypothesis and conclude that the residuals have no serial correlation. This is desirable.

4.4.6 Normality Test on Holiday Effect

Table 4. 21:Shapiro-Wilk test for normal data of holiday effect

Variable	Obs	W	V	z	Prob >z
R	266	0.93925	11.636	5.727	0.0510

Source: Author 2020

Null Hypothesis: Residuals are not normally distributed

Alternative Hypothesis: Residuals are normally distributed

From the table 4.2.4 above, the p-value is 0.0510 greater than 0.05, we reject the null hypothesis and accept the alternative hypothesis and conclude that the residuals are normally distributed. This is desirable.

4.4.7 Test for Arch Effect on holiday effect

TABLE 4. 22:LM test for autoregressive conditional heteroscedasticity (ARCH)

Lags	Chi2	df	Prob >chi2
1	4.890	1	0.0270

Source : Author 2020

H0: no ARCH effects vs. H1: ARCH(p) disturbance

Null Hypothesis: No ARCH effect

Alternative Hypothesis: ARCH(p) disturbance

From the results the p value is 0.0270 less (<) 0.05, we reject Null hypothesis (H0) and accept the alternate hypothesis (H1) conclude that there is ARCH disturbance in the model. This is not desirable.

The results of the diagnostic test conducted on the OLS model to determine its reliability fall short. The residuals have clustering volatility and ARCH disturbance, thus the need to run the EGARCH Model.

4.4.8 EGARCH of the Holiday Effect

TABLE 4. 23: EGARCH of the Holiday Effect

ARCH family regression				Number of obs = 266 Wald chi2(1) = 1.71 Pro > chi 2 = 0.1907	
StockReturn	**Conf.**	**Std.Err**	**Z**	**P>z**	**(98% Conf. Interval)**
Mean Equation					
DHoliday Effect	0.0434373	0.033198	1.31	0.191	-0.0216297 0.1085042
Cons	0.0331212	0.275888	1.20	0.230	-0.0209518 0.0871942
Variance Equation ω, α, y &β					
ω	-0.184754	0.0945925	-1.95	0.051	-0.3701519 0.0006439
α	0.0593196	0.0426413	3.61	0.000	0.1483427 0.5014876
y	0.9134007	0.428326	21.32	0.000	0.8294504 0.997351
β	0.3249151	0.0900896	3.61	0.000	0.1483427 0.5014876

In the mean equation the coefficient of the holiday effect is positive (0.0434373) with a p-value of 0.191 which is greater than the 0.05 hence statistically insignificant in explaining the holiday effect of the NSE 20 share index return at the Nairobi Securities Exchange. This finding is inconsistent with the previous studies at Nairobi Securities Exchange by (Hemed,2015; Omar,2015).

From the conditional variance equation, the constant (ω) has a negative coefficient and is insignificant, the Arch (α) is significant meaning clustering volatility, the Garch (β) is also significant meaning previous days' volatility can influence the volatility of today's stock return, the leverage effect (y) has a positive coefficient (0.9134007) and significant p = 0.000 < 0.05. Thus no leverage effect. The positive leverage effect refers to good news or shocks in the stock market which generate less volatility than bad news.

4.4.9 Post Diagnostic Test of the EGARCH Model on Holiday Effect

TABLE 4. 24: Serial correlation of post diagnostic test of Holiday Effect

LAG	AC	PAC	Q	Prob>Q	[Autocorrelation]	[Partial Autocor]
1	0.222	0.2223	1.259	0.0503	-	-
2	0.1775	0.1351	1.772	0.0511	-	-
3	0.1435	0.0853	2.351	0.0623	-	
4	0.1719	0.114	3.393	0.0635	-	
5	0.0056	-0.0843	3.402	0.0641		
6	0.031	-0.0043	3.666	0.0675		
7	0.1778	0.174	4.372	0.0725	-	-
8	0.1043	0.0341	4.376	0.0737		
9	-0.0435	-0.1162	4.902	0.0761		
10	-0.0449	-0.0806	4.463	0.0771		
11	0.027	0.0152	4.667	0.0781		
12	-0.0995	-0.0894	5.447	0.0812		
13	-0.0197	0.0595	5.556	0.0834		
14	-0.0928	-0.11	5.993	0.0881		
15	-0.0025	0.0055	5.995	0.0889		
.						

Source: Author 2020

Null hypothesis: There is no serial correlation in the residual

Alt hypothesis: There is a serial correlation

From the table above, the p-values are all greater than 0.05 we fail to reject the null hypothesis and conclude that there is no serial correlation. This proves that the model is a good fit. The Q-statistics values are greater than 0.05 indicating absence of the ARCH effects.

CHAPTER FIVE

SUMMARY, CONCLUSSIONS AND RECOMMENDATION

5.1 Introduction

In this chapter the summary, conclusion and the research findings on the study and recommendations on areas of further research study are presented.

5.2 Summary

The general objective of this study was to determine the effect of seasonal market anomalies on the stock market return among Companies listed at the Nairobi Securities Exchange in Kenya for the period September 2000 to December 2019. The daily NSE 20 share index closing prices were used to generate the percentage stock market returns. The specific objectives of the study focused on three seasonal market anomalies mainly weekend effect, turn of the month effect and holiday effect on the stock market returns at the Nairobi Securities Exchange. The study first used the OLS Model to test whether all the classical linear conditions were met, asymmetric EGARCH (1,1) models, was then employed. The ARCH-family model was found to be appropriate because of its robustness in capturing the various features of financial returns e.g. the volatility clustering, leptokurtosis, heteroscedasticity and the leverage effect that cannot be modelled when OLS Model is adopted. The study used EGARCH (1,1) model as it does not require a condition of non-negativity constraints and that it allows for asymmetric effect between positive and negative assets returns. EGARCH (1,1) model accounts for leverage effect; the fact that negative shocks lead to a higher rise in volatility than positive shocks of the same magnitude. The model has two equations, the mean equation and variance equation. In the variance equation, four parameters were estimated ω, α ,β& y. The estimated coefficients of the constant term for the conditional variance is ω , α represents the ARCH term that measures the magnitude of the shocks of the news about volatility, β is the GARCH term, it captures the persistence in the conditional variance. y captures the asymmetries; if negative shocks are followed by higher volatility, then the estimate of will be negative. $y > 0$, Indicates positive news while $y<0$ indicates bad news.

5.2.3 Weekend effect anomaly on stock market return

The characteristics of the data was first presented by the descriptive statistics. Friday recorded the highest mean return while Tuesday had the lowest mean return. This temporarily confirmed the Friday effect but not Monday effect on the stock return of the NSE 20 Share Index during the period under study. The stock return was observed to have a volatile clustering in the weekend effect. The weekend effect time plot (Figure 4.1) showed a rise between 1800 and again 3125. The stock return was stationery as tested using the Augmented Dickey Fuller test and that there was arch effect in the returns as tested by the LM test for autoregressive conditional heteroscedasticity (ARCH) necessitating the need to use ARCH Model family. In this study EGARCH was adopted.

The results of the EGARCH Model confirmed the Weekend effect. In the mean equation Monday recorded the highest negative significant coefficient confirming the presence of the Monday Effect while Friday recorded the highest positive significant coefficient confirming Friday effect. These results are not consistent with the results of the descriptive statistics. Therefore, the study confirms that the weekend effect has a significant effect on the stock return of the NSE -20 Share index at the Nairobi Securities Exchange. Implying investors can rely of the weekend effect anomaly to earn abnormal returns while trading at the Nairobi Securities Exchange. On the conditional variance equation, the Arch(α) is not significant while the Garch (β) is significant meaning previous days' volatility can influence the volatility of today's stock return. The leverage effect (y) is positive with significant p-value confirming positive shocks (good news). The positive asymmetric term implies that positive shocks have a greater impact on volatility than negative shocks of the same magnitude as suggested by Nelson (1991) for the specification test.

5.2.4 Turn of the month effect anomaly on stock market return

On the turn of the month effect descriptive statistics showed that the mean return and volatility of the turn of the month were higher than the non-turn of the month days. This temporarily showed that turn of the month effect anomaly has a significant effect on the stock return of NSE 20 Share Index during the period under study. Volatile clustering was observed in the time plots Figure No. 4.2 of turn of the month effect. The stock return was stationery as tested using the Augmented Dickey Fuller test and that there was Arch effect

in the returns as tested by the LM test for autoregressive conditional heteroscedasticity (ARCH) necessitating the need to use ARCH Model family. In this study EGARCH was adopted.

The mean equation for the turn of the month effect shows that the coefficient of the turn of the month is positive and significant thus indicating that turn of the month effect influences the stock return of NSE 20 share at the NSE. This implies that risk averse investors in the stock market can actively trade in the stock market a day just before the month ends and three days just after the month end and earn abnormal return at the NSE. From the variance equation, the leverage effect (y) has a positive coefficient which is significant. The positive leverage effect means that positive information or shocks generate less volatility than negative information. When the return is volatile then the risk of investing on the stock market goes up thus investors are likely to shift their funds to less risky investments.

5.2.5 Holiday effect anomaly on stock market return

The descriptive statistics showed high average mean return and volatility for the holiday effect. This temporarily showed that holiday effect anomalies have a significant effect on the stock market return of the NSE 20 Share Index during the period under study.

The stock return was observed to have a volatile clustering in the holiday effect time plots (Figure 4.3). The stock return was stationery as tested using the Augmented Dickey Fuller test and that there was arch effect in the returns as tested by the LM test for autoregressive conditional heteroscedasticity (ARCH) necessitating the need to use ARCH Model family. In this study EGARCH was adopted.

The mean equation for the holiday effect shows that the coefficient of the holiday effect is positive and insignificant hence did not show the presence of the holiday effect. From the variance equation, the leverage effect (y) has a positive coefficient. The positive leverage effect means that positive information or shocks generate less volatility than negative information. When the return is volatile then the risk of the business goes up and investors are likely to shift their funds to less risky investments.

Post estimation diagnostic analysis was also carried out on all the independent variables; weekend effect, turn of the month effect and holiday effect. The findings showed that residual had constant variance and did not exhibit autocorrelation. Hence this confirmed the accuracy of the EGARCH model results.

5.3 Conclusion

The descriptive statistics results did not show the weekend effect at the NSE although the turn of the month effect and the holiday effect was confirmed to exist at the NSE. The EGARCH estimations mean equation shows that Friday exhibited the highest significant returns with Monday having the lowest significant returns hence confirming the presence of weekend effect at the NSE. The positive asymmetric effect on the weekend effect shows a decrease in the volatility of the returns at the NSE.

The EGARCH estimations of the turn of the month effect recorded significantly highest return this confirmed presence of the turn of the month at the NSE in the mean equation. The positive and significant asymmetric effect on the turn of the month shows a decrease in volatility on the return at the NSE.

The EGARCH estimations of the holiday effect show that the coefficient of the holiday effect is positive and insignificant hence did not show the presence of holiday effect. The positive and significant asymmetric effect on the holiday effect shows a decrease in the volatility of the return at the NSE.

All the three variables recorded positive leverage effect in the variance equation implying that there was no leverage effect on the weekend effect, turn of the month effect and the holiday effect. Positive leverage effect is associated with good news/positive information and volatility tend to below as risk averse investors tend to which is normally associated with high volatility. The results show presence of weekend effect and turn of the month effect of NSE 20 Share Index implying that the NSE is not efficient, this contradicts the efficient market hypothesis theory which states that stock markets are efficient. The difference in the mean return of the days of the week also shows that the return is random and not static confirming the random walk theory. The findings confirm the prospect theory through the movement of stock at particular times. The findings on the weekend effect and turn of the month anomalies, imply that investors can make predictions by relying on market timings as the inefficiency in the market open the possibility of formulating profitable trading rules of earning abnormal returns when investing on the NSE 20 share index at the Nairobi Securities Exchange.

5.4 Recommendations

The study finds the presence of seasonal anomalies on the weekend effect and the turn of the month effect at the NSE which means the NSE is not efficient. The Capital Market Authority of Kenya which is the umbrella body tasked with mandate of ensuring the creation of regulation in the capital market where securities can be issued, treated in an orderly, fair and efficient manner; should look for appropriate measures, strategies, regulations and policies to ensure an appropriate system is implemented and information availed at all-time to all market participants to ensure fair and efficient market.

The study also recommends the stock market investors/participants to first examine the market to observe the trend to help them develop a portfolio that will aid them in ensuring they maximize returns at all time. This is because there are other forces that influence the market returns like the symmetric risks and volatility of the stock returns.

5.5. Recommendations for further studies

The study used EGARCH (1,1) model in the analysis, the model does not take into consideration auxiliary movements in its present structure. Extending the model to accommodate potential movements would presumably improve the results as well as the forecasting accuracy. The study finding did not confirm the presence of Holiday effect at the NSE further studies should consider increasing the scope of the study and use a different interval on the days to further confirm this anomaly. Further studies may be carried out for other extensions to the GARCH model like T-GARCH, M-GARCH P-GARCH and I-GARCH and compare the results. This study focused on NSE 20 share Index, a similar study can be carried out on NSE All Share Index and other market segments. The study also relied on seasonal market anomalies future studies can be done on other market anomalies like the fundamental and technical anomalies. Other seasonal anomalies like the beginning of the month anomaly, mid of the year anomaly, post-holiday anomalies can be looked at in future studies.

Although Nairobi Securities exchange is the leading market in East African, market indices from other East Africa Counties like Uganda, Tanzania, Burundi and Rwanda can be considered in future and this study replicated for comparison. A wider scope can also be taken into consideration.

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APPENDICES

Appendix 1: Companies listed as NSE - 20 Share Index

S/N	Sector	List of Companies
1.	Banking Sector	Barclays Bank of Kenya Ltd, Diamond Trust Bank Ltd, Equity Group Holding PLC, KBC Group Plc, NIC Group Plc, Standard Chartered Bank Kenya Ltd Co-operative Bank of Kenya Ltd.
2.	Commercial and Services Sector	Nation Media Grup Plc, WPP Scan group Plc and Kenya Airways Plc.
3.	Construction and Allied Sector	Bamburi Cement Ltd
4.	Energy and Petroleum Sector	Kengen Co. Plc Kenya Power & Lighting Co. Ltd
5.	Insurance Sector	Britam Holding PLC, Kenya Re-Insurance Corporation Ltd
6.	Investment Sector	Centum Investment Co. Plc.
7.	Investment Services Sector	Nairobi Securities Exchange PLC
8.	Manufacturing and Allied Sector	British America Tobacco Kenya Plc East Africa Breweries Ltd
9.	Telecommunication Sector	Safaricom Plc (NSE,2020).

Appendix 11: Data Analysis sheets

Information for every independent variable: - Weekend effect, Turn of the month effect and Holiday Effect was gathered utilizing an information assortment sheet underneath.

a. Weekend Effect Analysis Sheet for the year September 2000 to 2019

Obs	**Day of the week**	**Date**	**End of the day Stock prices (Pt)**	**Start of the day Stock prices (Pt-1)**	**% Stock Daily Return (Rt)** $= (P_t - P_{t-1})/P_{t-1}) *100$
1	Tuesday	05-Sep-00	1,960.42	0.0000	0.00000000
2	Wednesday	06-Sep-00	1,964.24	1,960.42	0.19501377
3	Thursday	07-Sep-00	1,979.09	1,964.24	0.75578514
4	Friday	08-Sep-00	1,976.71	1,979.09	-0.11997131
5	Monday	11-Sep-00	1,977.40	1,976.71	0.03470174
6	Tuesday	12-Sep-00	1,977.90	1,977.40	0.02509833
7	Wednesday	13-Sep-00	1,993.52	1,977.90	0.78991704
8	Thursday	14-Sep-00	1,967.96	1,993.52	-1.28210850
9	Friday	15-Sep-00	1,965.51	1,967.96	-0.12447081
10	Monday	18-Sep-00	1,981.28	1,965.51	0.80213154
11	Tuesday	19-Sep-00	1,974.96	1,981.28	-0.31892077

12	Wednesday	20-Sep-00	1,980.79	1,974.96	0.29520299
13	Thursday	21-Sep-00	1,978.88	1,980.79	-0.09629267
14	Friday	22-Sep-00	1,972.88	1,978.88	-0.30318212
15	Monday	25-Sep-00	1,985.45	1,972.88	0.63699629
16	Tuesday	26-Sep-00	1,978.04	1,985.45	-0.37339808
17	Wednesday	27-Sep-00	1,995.33	1,978.04	0.87423486
18	Thursday	28-Sep-00	2,004.02	1,995.33	0.43544345
19	Friday	29-Sep-00	2,001.32	2,004.02	-0.13468814
20	Monday	02-Oct-00	2,001.33	2,001.32	0.00043375
21	Tuesday	03-Oct-00	2,001.58	2,001.33	0.01252323
22	Wednesday	04-Oct-00	2,003.13	2,001.58	0.07767765
23	Thursday	05-Oct-00	2,000.87	2,003.13	-0.11273753
24	Friday	06-Oct-00	1,997.73	2,000.87	-0.15705702
25	Monday	09-Oct-00	2,021.90	1,997.73	1.21004291

b. Turn of the month Effect Analysis Sheet for the year September 2000 to 2019

Year	Month	Obs	TOM(-1,+3)	NTOM
2000	Oct	1	-0.011013377	0.119821
	Nov	2	-1.275794729	-0.02052
	Dec	3	0.041545817	-0.00244
2001	Jan	4	-0.001876677	-0.01464
	Feb	5	0.294566271	0.056854
	March	6	-0.031788514	-0.26457
	April	7	-0.220008563	-0.16091
	May	8	0.069673676	-0.40277
	June	9	-0.093172403	0.120851
	July	10	0.019514894	-0.11748
	August	11	-0.256509567	-0.32303
	September	12	-0.208340808	-0.39764
	October	13	-0.417373527	0.300753
	November	14	-0.405095342	-0.19954
	December	15	-0.283156813	-0.30632
2002	Jan	16	0.183214638	-0.08147
	Feb	17	-0.291016921	-0.0719
	March	18	-0.253506208	-0.60096
	April	19	-0.164149683	-0.23954
	May	20	0.102986364	-0.29679
	June	21	0.169333989	0.097033
	July	22	0.212323782	0.035853
	August	23	-0.404231897	-0.17676
	September	24	0.21557211	-0.0112
	October	25	-0.360812106	0.460666
	November	26	1.398670773	0.062779
	December	27	0.317766228	1.143802
2003	Jan	28	3.37520394	0.034962
	Feb	29	-0.589453693	0.103889
	March	30	0.221137251	0.210563
	April	31	0.270908177	0.772402
	May	32	2.310080156	0.28069
	June	33	-0.419816473	-0.23547
	July	34	-0.230615764	0.190487
	August	35	0.26075591	0.284029
	September	36	-0.254546574	0.656953
	October	37	0.36369336	0.13636
	November	38	-0.062947353	0.707005
	December	39	0.525517934	-0.10534

C. Holiday Effect Analysis Sheet for the year 2000 to 2019

Year	Public Holidays	Obs	Holiday effect	% Stock Return
2001	New Year	1	Holiday Effect (-5,+3)	0.471477302
		2	Non-Holidays	-0.014644979
	Easter Holiday	3	Holiday Effect (-5,+3)	-0.053018606
		4	Non-Holidays	-0.201888335
	Labour Day	5	Holiday Effect (-5,+3)	-0.169898998
		6	Non-Holidays	-0.402767301
	Madaraka Day	7	Holiday Effect (-5,+3)	-0.159172637
		8	Non-Holidays	0.120851192
	Mashujaa Day	9	Holiday Effect (-5,+3)	0.553108916
		10	Non-Holidays	0.04762714
	Jamhuri Day	11	Holiday Effect (-5,+3)	-0.300062576
		12	Non-Holidays	-0.355541557
	Christmas/Boxing	13	Holiday Effect (-5,+3)	-0.374822641
		14	Non-Holidays	-0.18663359
2002	New Year	15	Holiday Effect (-5,+3)	0.075147575
		16	Non-Holidays	-0.081470477
	Easter Holiday	17	Holiday Effect (-5,+3)	-0.402413497
		18	Non-Holidays	-0.497808051
	Labour Day	19	Holiday Effect (-5,+3)	-0.027369728
		20	Non-Holidays	-0.296789637
	Madaraka Day	21	Holiday Effect (-5,+3)	0.056138153
		22	Non-Holidays	0.097033062
	Mashujaa Day	23	Holiday Effect (-5,+3)	0.33903782
		24	Non-Holidays	0.120997802
	Jamhuri Day	25	Holiday Effect (-5,+3)	1.010019207
		26	Non-Holidays	0.836800584

	Christmas/Boxing	27	Holiday Effect (-5,+3)	1.229316915
		28	Non-Holidays	0.795977161

Appendix III: Budget

Details	**Budget inclusive of VAT**	**Period**	**Total Budget Kshs.**
NSE Indices Data (NSE-20 Share Index)	Charges Kshs.1,16 per year excel data	@ 20 Years	2,320/-
Printing	80 Pages @10/- @5Copies		4,000/-
Binding	1,000 @ 5Copies		5,000/-
Telephone	2,000/-		2,000/-
Transport	3,000/-		3,000/-
Internet Charges	@1000/- per month	5Months	5,000/-
TOTAL			**21,320/**