DETERMINING THE EXISTENCE OF CALENDAR ANOMALIES ON STOCK RETURNS AT THE NAIROBI SECURITIES EXCHANGE MARKET: PRE AND POST THE 2015 REFORMS

BY

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DECLARATION

I declare that this research project is my original work and has never been presented for award of a degree in any other university or institution.

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Supervisor's Approval

This research project has been submitted for examination with my approval as the university supervisor.

Signature……………………………. Date………………………….

THOMAS ONGORO

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DEDICATION

I dedicate this research project to my late mom and dad, the entire Gworo's family, and all friends. Were it not for your moral, spiritual, and financial support, this would have remained a dream.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

AIMS - Alternative Investments Market Segment

ATS - Automated Trading Systems

BG - Breusch-Pagan test

CDS - Central Depository System

CMA – Capital Markets Authority

CV – Coefficience of Variation

DASS - Delivery and Settlement System

EMH – Efficient Market Hypothesis

FISD - Financial Information Services Division

FISMS - Fixed Income Securities Market Segment

FOMS - Futures and Options Market Segment

GARCH - Generalized Autoregressive Conditional Heteroskedasticity

GDP – Gross Domestic Product

IFC - International Finance Corporation

IOP - Initial Public Offer

LSE – London Stock Exchange

MIMS - Main Investments Market Segment

NASI- NSE All-Share Index

NSE – Nairobi Securities Exchange

OLS - Ordinary Least Square

OLS – Ordinary Least Square

OTC – Over the Counter

RESET - Ramsey’s Regression Specification Error Test

RWH - Random Walk Hypothesis

SD – Standard Deviation

SIIA - Software and Information Industry Association

VIF – Variance Inflation Factor

WB – World Bank

DEFINTION OF TERMS

The follow are the meanings of these key terminologies as used in this research project.

Seasonality – Refers to the fluctuation of stock returns in accordance with different seasons or periods of the year.

Calendar Anomalies – Represent the abnormal deviations in the stock returns which contravenes the efficient market hypothesis.

Calendar Effects – Refers to the influence of various calendar dates such as the days of the week, months of the year and days of the month on stock returns.

Stock Returns – The average prices of securities, bonds, or shared traded in the capital market.

Stock Exchange - a highly organized market facilitating the purchase and sale of securities and operated by professional stockbrokers and market makers according to fixed rules of the capital market.

Capital Markets – Represent financial systems and markets where financial securities, shares, bonds, and stocks are traded by institutions and individuals.

January Effect – The first month of the year in which stock returns are higher because of the tax-loss sales effects in December.

Day of the week effect – It defines the variation in stock returns during different days of the week from Monday to Friday.

Monday Effect and Friday Effect – A theory founded on the premise that stock returns on Mondays and Fridays tend to be low than the rest of the days of the week because of the effects of the weekend as well as the fact that companies often release bad news mainly on Fridays.

ABSTRACT

Random movements of stock returns have been studied since the introduction of the Efficient Market Hypothesis in the 1960s. Particularly, a range of stock calendar anomalies such as the Monday effect, the incredible January effect, and holiday effects have been explored and documentary especially in developed capital markets. Though such studies have covered developing capital markets, mixed results have been generated regarding the existence of calendar anomalies and stock returns seasonality. At the Nairobi Security Exchange (NSE), many studies have only investigated the size effect and the holiday effects on stock returns. Differences in methodological approaches sample size used have been identified as possible reasons for the mixed results regarding calendar anomalies at the NSE. This study, therefore, sought to determine the existence of calendar anomalies at the NSE pre and post the 2015 structural, operational, and institutional reforms introduced by the capital markets authority (CMA). The study used panel data collected from the NSE covering average daily, weekly, and monthly returns from January 2010 to December 2017 and analyzed using STATA. The study was theorized on the Random Walk and Efficient Market hypotheses by Burton and Eugene Fama respectively. Markov's Regime-Switch Models (MRS) particularly the Calendar Time Hypotheis (CTH) by Tang was the theoretical framework used in the study. Anderson-Darling test was conducted to determine the normality of the distribution. Another diagnostic test done was the Breusch-Pegan heteroscedasticity test. In examining the day-of-the-week effects, the study found that stock returns were lower on Mondays and Fridays both pre and post the 2015 reforms, these were statistically insignificant to justify the Monday and the day of the week effects. The January effect or month of the year effect was not observed at the NSE. Therefore, the study concluded that the 2015 reforms did not contribute significantly making the NSE more efficient as was intended by the CMA. Undoubtedly, the findings of this study will not only fill the empirical gaps but also be very helpful to stockbrokers and investors with passion for stock investments.

Keywords: Stocks, returns, NSE, CMA, calendar, anomalies, and investors.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Since the introduction of market efficiency theory, the famous Efficient Market Hypothesis (EMH) by Eugene Fama in the 1960s (Fama, 1965), this topic has attracted mixed debates involving financial economists, investment analysts, and other stakeholders in the capital market. As a result, many studies have been conducted to explore random movements of stock returns in developed and emerging capital markets, purposely to demonstrate the efficiency of capital markets. From such studies, a range of stock calendar anomalies have been documented in literature, with the 'Incredible January Effect' and the 'Monday effect' being the extensively studied ones.

Evidently, stock prices or market returns tend to follow seasonal patterns that violate the Fama's EMH; specifically the weak-form market efficiency assumptions. Ball (2008) contended that it is impractical beating the stock market continuously through observing and analyzing historical information relating to the stock and its prices. Haugen and Jorion (2006) asserted that beating the market and making supernormal profits is only possible in a short-run since investors often draw lessons from past experiences. Samuelson (2002) established that to date, the "January effect" remains significant. Similarly, the day-of-the-week effect, the holiday effect, as well as the end-year effect have been found to affect stock returns in many markets. Consequently, it is important to determine calendar anomalies and their impact on the stock returns in Kenya.

Stock returns seasonality especially in developed capital markets is one of the areas that attracted research interests since the 1960s. Ball (2008) described the 'calendar effect' as abnormal low or high average returns on stocks on different dates, particularly the day-of-the-week, month-of-the-year, and day-of-the-month effects. According to the EMH, no investor can beat the market repeatedly for a considerably long period of time. Ideally, it is because immediately market anomalies have been identified, studied, analyzed, and explained, they disappear gradually (Ball, 2008). Therefore, the continuity of calendar effects is itself considered an anomaly. Despite many studies about anomalies in stock returns, recent findings have established that such seasonality continues to be reported in emerging and established stock markets across the world (Polwitoon and Tawatnuntachai, 2008). On the other hand, some researchers among them Nippani and Arize (2007) indicated that calendar anomalies are becoming insignificant and disappearing especially in developed stock markets overtime.

1.1.1 An Overview of the Nairobi Securities Exchange (NSE) Market

The Nairobi Securities Exchange dates back to the early 1920s when Kenya was under the British colonial government. Notably, there existed no formal stock exchange market then with lack of regulations, policies, and rules governing stock trading and broking activities being the typical characteristics of the market. All trading activities were conducted on gentlemen's agreement with traders obliged to honour individual contractual commitments of settling transactional costs and commissions involved. At the time, the informal stock-broking was deemed a side hustle business mainly dominated by lawyers, estate agents, accountants, and auctioneers who exchanged prices over a cup of coffee (Nairobi Security Exchange (NSE), 2015).

Professional stock broking activities were first carried out in 1951 by the Estate Agent Francis Drummond; an idea that impressed Sir Ernest Vasey, then Finance Minister of Kenya, who felt it was time to formalize stock trading in East Africa (NSE, 2015). Francis Drummond and Sir Ernest Vasey developed a proposal that was presented to the London Stock Exchange (LSE) authorities, paving way for the creation of the NSE as one of its overseas subsidiary stock markets by July, 1953 (NSE, 2015).

A year later, the NSE was officially registered and constituted in accordance with the Societies Act (NSE, 1997) as a voluntary connotation of stockbrokers. It was primarily responsible for advancing stock market regulatory frameworks and trading policies. Though commercial stock trading remained restricted to the Europeans, hence limited involvements of the Asians and Africans in securities dealings (NSE, 1997).

The NSE continued to evolve until during the independence in 1963 when the stock market slumped because of the political and economic uncertainties surrounding the country. Three years afterwards, confidence in the securities market rekindled following the restoration of calmness and economic stability (NSE, 2015). This growth was, however, adversely affected by the inflationary pressure caused by the 1972 global oil crisis. Share prices of major stocks traded in the NSE dropped sharply. The introduction of the 35% tax on capital gain in 1975 further inflicted more pain to the sector; though this tax law has since been suspended (NSE, 2015). It was during this period that the NSE lost its regional dominance following exchange control restrictions that were introduced by Uganda and Tanzania (NSE, 2015). The collapse of the East African Community in 1975 resulted in the nationalization of companies that were subsidiaries of listed corporations, thus negatively impacting on the NSE (NSE, 2015).

Following the need for a sustainable economic growth in Kenya, the government heightened the involvement of the private sector in the capital market. A 1984 study by the Central Bank of

Kenya (CBK) titled "*Development of Money and Capital Markets in Kenya*" served as the blueprint for operational, structural, and functional reforms particularly for the country's financial sector. As a result, the move culminated in the establishment of the Capital Markets Authority (CMA) in 1989 through Capital Markets Authority Act (Cap. 495A). CMA is the regulatory body responsible for creating favourable environment for capital market operations in the country. The first privatization of public enterprises through the NSE occurred in 1988 when the state sold off 20% of its Kenya Commercial Bank shares (NSE, 2015).

The NSE got registered in 1991 to operate as a private limited company, with trading of shares being conducted in a "Floor-based Open Outcry System" at the IPS Building, hence phasing out the "Call Over" system that had dominated for decades. However, the computerized delivery and settlement system (DASS) was introduced in 1994 when the NSE moved its operations to Nation Centre Building. This was followed by the amendment of the CMA Act to allow for increased involvement of stockbrokers and investment advisors (NSE, 2015).

The development of the NSE was further accelerated by the annulling of the Exchange Control Act, which occurred in December 1995. This resulted in a favourable tax regime that exempted listed securities from capital gains taxation, value added tax, and stamp duty. Withholding tax on stock dividends, on the other hand, was fixed as low as 10% and 5% for non-residents and residents respectively (NSE, 2015). It was in 1996 that the NSE recorded its largest share issue following the privatization of the Kenya Airways as the government offered 235,423,896 of its shares in the corporation for public subscription at share price of Ksh. 11.25 (NSE, 2015).

In March 1999, through the Companies Act (Cap 486), the Central Depository and Settlement Corporation Limited (CDSC) got introduced. The Central Depository System (CDS) Act soon followed in July 2000, which paved way for the Capital Markets Act. In 2001, the country's capital market was heavily restructured leading to its division into four independent segments (NSE, 2015). These encompass the Main Investments Market Segment (MIMS), the Alternative Investments Market Segment (AIMS), the Fixed Income Securities Market Segment (FISMS) and the Futures and Options Market Segment (FOMS).

Following a series of technological advancements in the capital market of Kenya, live stock trading through automated trading systems (ATS) was first launched in the NSE in 2006 (NSE, 2015). As a result, the number of shares traded increased immensely. Additionally, transactional charges, commissions rates on both fixed interest securities and equities considerably decreased to as low as 0.5% and 2% respectively (NSE, 2015). The implementation of the ATS made it possible for investors to invest in immobilized treasury and corporate bonds. Moreover, the market hours increased from 2 hrs (10:00 am – 12:00 pm) to 3 hrs (10:00 am – 1:00 pm) a day from Monday to Friday. The ATS was immediately followed by the popular Wide Area Network system at the NSE market in 2007, which encouraged remote stock trading. The NSE then extended its trading hours at the bourse from 9:00 am to 3:00 pm but only during official working days (NSE, 2015).

In February 2008, the NSE launched the NSE All-Share Index (NASI) targeted at providing investors and stockbrokers with an inclusive measure of the stock market's performance. The same year, the Safaricom Ltd. initial public offer (IPO) made a significant impact on stock trading. However, it was not until December 2009 that government bonds started trading on the ATS (NSE, 2015).

In 2011, the settlement cycle for equity moved to the T+3 from the previous T+4 settlement cycle. This reduced stock settlement period to three days after the trading date rather than the four-day settlement period that had existed for decades. The same year, the Nairobi Stock Exchange Limited was renamed to Nairobi Securities Exchange Limited in accordance with its 2000-2014 strategic plan (NSE, 2015). The change of was necessitated by the desire to evolve the market into a full-service securities trading center with the ability to support liberalized trading, settlement and clearing of debts, derivatives, and equities, as well as other associated instruments. In early 2012, the NSE joined the Financial Information Services Division (FISD) of the Software and Information Industry Association (SIIA), hence expanding its scope of operations. The NSE proceeded to sign a number of Memorandums Understanding with (including but not limited to) the Korea Exchange (KRX), Shanghai Securities Exchange, and the Somali's capital market authority. In 2015, the CMA undertook multiple reforms at the NSE in order eliminate inefficiencies and challenges experienced in the past (NSE, 2015).

1.1. Statement of the Problem

Since the turn of the new millennium, interests in study financial markets of emerging economies has increased significantly. This is attributed to the fact that such markets not only promise but also offer relatively high returns on equity and fixed-income securities compared to developed markets. For instance, a sovereign bond in the U.S. yields a 2-5% return while the same bond with similar features generates 6-10% rate of return in the emerging economies (Jaffe and Westerfield, 2015). Though the day-of-the-week and day-of-the-month effects in stock market seasonality have been studies in developing economies including, mixed results have been documented. The month-of-the-year effects on stock performance studies involving developing stock markets such as Mexico, Brazil, Nigeria, and South Africa among others have consistently found positive results (Cooper et al., 2006).

In Kenyan, many studies have majorly focused on the size effects and the holiday effects on the stock performance at the NSE. However, Oman (2012), Obere (2009), and Kingori (1995) studied the holiday effects, the monthly effect and other stock market seasonality. Interestingly, these studies found mixed results concerning the seasonality of stock returns in Kenya. They concluded that stock market seasonality at the NSE is dependent on the period of the study, number of variables, and the methodological approaches used in the study. Additionally, methodological gaps have been pointed out in more than 80% of studies on stock market seasonality in developing economies (Jaffe and Westerfield, 2015). Besides applying short-estimation methods which are least affected by data smoothing, this research project used the symmetric GARCH(1,1) to address the methodological gaps in past findings. Specifically, this research factored in the effects of 2015 structural and operational reforms in the NSE that were mainly aimed at eliminating information asymmetry and increasing efficiency at the NSE.

1.4 Research Questions

This study answered the following question:

i) Did calendar anomalies exist at the NSE pre and post the 2015 reforms by the Capital Market Authority?

ii) Have the 2015 stock market reforms by the CMA played a significant role in eliminating stock return inefficiencies at the NSE?

1.2. Objectives of the Study

1.3.1 General Objective

The main objective of this study was to determine the existence of calendar anomalies on stock returns at the NSE market pre and post the 2015 reforms by CMA.

1.3.2 Specific Objectives

I. To study calendar anomalies pattern at the NSE pre and post the 2015 stock market reforms.

II. To examine whether the 2015 stock market reforms by the CMA played a significant role in eliminating stock return inefficiencies at the NSE.

III. To use the findings of the study to come up with recommendations for capital market investors ways to beat the market during anomalies.

1.3. Significance of the Study

Undeniably, the contribution of capital markets in the creation of financial inclusivity cannot be overlooked. A vibrant and developed stock market is an important determinant of economic development in advanced and advancing economies. Nonetheless, studies document mixed findings regarding the existence and effects of the calendar on stock returns. Though empirical studies have been conducted for investigating calendar anomalies in stock returns, the focus is on developed stock exchange markets with limited emphasis being on the developing stock markets like the NSE. This study is key in filling the empirical gap concerning calendar anomalies and stock returns seasonality in Kenya. The results of the research, therefore, adds to the existing body of knowledge regarding the seasonality of stock returns in Kenya. This would be fundamental for the formulation of relevant policies to ensure informed investment decisions at the NSE. Additionally, the study findings are important to various stakeholders; Prospective investors at the NSE can take advantage of the findings of this study to make informed investment decisions regarding when or not to invest at the NSE. Besides, the findings of this study serve a foundation for further analysis and research for scholars with interest in capital markets.

1.4. Organization of the Study

Following this introductory chapter which covers background, research problem, research objectives, and significance of the study is Chapter Two–Literature Review which presents theoretical literature, the guiding theories, and empirical literature findings from past studies. This is followed by Chapter Three–Research Methodology which covers theoretical and empirical frameworks, data sources, estimation techniques, and diagnostic tests applied in the research. Chapter Four–Results and Discussion detailed the findings of the study for the day of the week and the monthly effects as well as the proposed recommendations. And finally, Chapter Five-Conclusion and Recommendations outlines the summary of the key findings for the study, study limitations, and suggestions for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter explores the theoretical and empirical literature together with conceptual framework concerning the calendar anomalies and how they affect stock returns in advanced and advancing markets. In brief, the chapter outlines past studies, theoretical literature, and findings relating to calendar anomalies and stock returns. The chapter is divided into two major parts: Theoretical and Empirical.

2.2 Theoretical Literature Review

2.2.1 History of the Market Efficiency Theory

Market efficiency theory first featured in a mathematics PhD. thesis of Bachelier in 1920. The study found that prices of commodities in the market fluctuate randomly. However, a half a century later, this conclusion was discredited. Working independent of Bachelier at al. (1937) and Working (1934) concluded that the stock prices in the U.S. fluctuate randomly. Their findings prompted further investigations by many researchers including Samuelson and Mandelbrot (1963), who presented a totally new price behavior model using the Pareto distribution and natural logarithm to the pricing system, which found that stock returns fluctuate randomly. Fama (1965) further investigated market efficiency concept and concluded that stock returns often follow a random walk.

2.2.2 Efficient Market Hypothesis

Financial markets have been found to be efficient given that most of the firms and investors have access to the necessary and most basic information relating to any particular stock market. However, for these markets to be allocationally efficient there is need for external and internal efficiency. A stock market considered externally efficient when the information about the prevailing market conditions are widely and quickly disseminated thereby allowing the security prices to adjust accordingly to the new set of information hence reflecting the value of the investment. Internally efficient market, on the other hand, describes those stock markets where dealers and brokers compete fairly such that the cost of transactions become relatively low while the speed of transactions in the market is high (Sharpe et al., 2009).

According to Arize and Nippani (2007), capital markets are described as 'efficient' only if stock prices are fully reflecting the whole information set that are available to the investors, who use such information set when making their investment decisions. Such sets of information must be unique and surprising, hence unpredictable. Since all the information is made public and available to all investors, they are exhaustively included the stock pricing. Consequently, no investor can outdo the market by making supernormal profits on stock investment. In perfectly efficient markets, stock prices change randomly, hence following the 'random walk model'. Stock returns happen to be identical in distribution overtime. In the view of Elton (2005), the fact that stock returns are normally distributed implies that irregular patterns like the Monday effect or the January effect should not exist. Should such patterns occur, they should not be continuous and should be eliminated during securities trading (Elton, 2005).

2.2.3 Market Efficiency Forms

From the amount of information reflected in the prices of securities, there exist three types/forms of market efficiency, which are:

2.2.3.1 The Weak Form of Market Efficiency

This is a type of market efficiency where stock returns incorporate all historical information concerning the security prices. In the markets that satisfy this criterion, it is impossible for any investor to make superior profits by relying or analyzing the historical patterns in the stock prices. With prices following the random walk, calendar anomalies should not be experienced (Sharpe at al., 2009), hence rendering technical efficiency irrelevant.

This implies that historical information relating to the prices and volume are reflected in the current pricing of securities. Therefore, in markets exhibiting this type of efficiency, beating the market odds to earn supernormal returns through relying on technical analysis founded on the historical price movements is impractical. In fact, it is not possible to accurately predict the rates of returns using historical prices as the patterns are unpredictable. Weak form market efficiency is characterized by unpredictable and random stock returns behavior as well as the independence of the rate of return on stock investments. This type of market efficiency is relevant to the popular Random Walk Hypothesis, which states that "stock prices follow a random walk process and it is impossible depicting future price movements by only analyzing historical stock price movements" (Ogden, 2010).

2.2.3.2 Semi-strong Form of Market Efficiency

This form of efficiency states that the prices of stocks is a reflection of "both publicly available information set and past prices," hence fundamental efficiency is irrelevant in this case. Here, stock prices incorporate all the information which is publicly available such as announcements and financial statements, hence both technical and fundamental analyses from the publicly available set of information cannot be effective in beating the market (Polwitoon and Tawatnuntachai, 2008). It is because such analyses can be utilized in predicting or determining the misprices stocks (Tong, 2000).

2.2.3.3 Strong Form of Efficiency

Under this form of market efficiency, all publicly and privately available information sets are incorporated in stock pricing. However, this type of market efficiency mainly exists in theory. It states that "all sets of information, whether public or private, are reflected in stock prices" (Samuelson, 2002). This implies that even those individuals with private information or inside information, the insiders, concerning the future earnings of the stock cannot earn abnormal returns if they use such information to advantage themselves in the stock market. This is because all sets of information are already included in the pricing of the securities. Hence, strong form efficiency is a combination of semi-strong and weak forms of market efficiency.

2.2.4 The Random Walk Hypothesis

The Random Walk Hypothesis (RWH) is a theory that tests the assertion that stock prices often follow a random walk. It gained popularity following the *"A Random Walk Down Wall Street*" by Malkiel Burton during the 1970s (Tong, 2000). He accentuated the fact that stock returns are known to exhibit a 'random walk', thus making it unrealistic outperforming the market continuously (Tong, 2000). Also, he recognized the fact that any new information set is instantly and automatically incorporated and reflected in the stock market, such that current stock prices mirror the current information. But such security prices are independent of each other on any given day because of the predictability of the new information, hence the theory that 'stock prices are random' (Rosenberg, 2004).

According to the RWH, stock return changes show a similar distribution, but which are independent of each other, thus evolving in accordance with the random walk. This makes it impossible to depict successive price fluctuations by analyzing the past information or historical price movements of the stock prices (Tong, 2000). Specifically, the RWH model is founded on the belief that depicting the future stock values cannot provide any substantial information about those future values of securities because such returns are too random to predict with precision as they can either be lower or higher compared to the last observed prices. In the view of Fama (1965), the independence and randomness of stock prices variations are not parallel with the EMH, which is explained by the weak form market efficiency. The RWH concerns the non-stationary processes of stock returns.

2.2.5 The January Effect and Monthly Effect

Analysts and investment professionals have advanced a number of theories aimed at explaining the continued presence of stock returns monthly effect. The following are the most popular theories that explain the January effect.

2.2.5.1 The Tax-loss Selling Hypothesis

Reinganum (2003) revealed that small firms listed in stock markets often realize higher returns on their stocks particularly at the start of the year, which is January. In his argument, he linked such abnormal returns at the beginning of the year with the tax-loss selling theory. According to this theory, the 'January effect' arises from the fact that most investors opt to sell-off a sizeable proportion of their stock portfolios in December to claim a capital loss for taxation purposes.

Immediately there is a roll-over in the tax calendar year, usually in January, the very investors tend to reinvest their proceeds in the stock market, resulting in the 'gold rush' that further induces the stock prices to surge (Gao and Kling, 2005). However, the January effect can never be exclusively attributed to the tax-loss selling hypothesis. Notably, this theory was rendered irrelevant in countries whose financial year are not match the usual calendar year, that is, those economies whose calendar year does end in December.

2.2.5.2 The Cash and Liquidity Hypothesis

Contrary to Reinganum (2003), Ogden (2010) attributed the January effect to the liquidity and cash focus at the end of the year. He advanced the 'liquid profits' and 'turn-of-month' liquidity hypothesis to explain the monthly and the January effects respectively. In his view, the seasonality of stock returns can partially arise from the standardization of the payment systems and cash flows. Supporting this assertion, Liano et al. (2012) provided a strong evident that the January effect or monthly effect is strictly confined to economic expansion periods only. The absence of the monthly effect especially during economic contractions is a strong indication of the role of business cycles in influencing the monthly effect, particularly in the OTC stock markets. This theory is also supported by Rosenberg (2004) who found that economic cycles and calendar anomalies are dependent.

2.2.6 Other Prospective Reasons Explaining the Calendar Anomalies and Patterns

Expressively, Elton and Gruber (2005) mentioned that it is practically impossible and untenable to specify the source of the variation of the calendar patterns in stock returns. However, from the existing empirical data there is reasonable hope that a formidable pattern may be found though the trends are random and uncontrolled. Illustratively, if this argument is to suffice then the variations should also not persist in the other markets. Another reason that cannot escape attention is that the markets might be inefficient because with the exploitation and market penetration by investors, the patterns would be expected to disappear or decline steadily. The transaction costs could be another explanation to modify this reasoning. Moreover, the negative stock returns on Mondays could be attributed to the bad news that investors might have received on Fridays of the preceding weeks (Tong, 2000).

Keef and McGuinness (2001) suggested that the procedures that are used in settlement processes could be responsible for the Monday effect. This argument emanated from the day-of-the-week consideration in the New Zealand security market. Kumari and Mahendra (2006) also threw their back behind this argument. In retrospect, it is being overlooked that settlement processes vary from one country to the other.

The Investors' Psychology is another explanation detailing the presence of the Monday effect (Rystrom and Benson, 2009). According to this theory, investors may be irrational and succumb to the pressures of life such as emotions and moods. Thus, if these human psychological traits such as moods and emotions differ or improve gradually then the level of optimism would experience a similar boot and measure, thereby explaining the differences in returns to assets/stocks. For instance, if investors are less optimistic about Mondays compared to other days, then they tend to offset their assets and security holdings; hence dampening the prices in the markets. Similarly, on Fridays the investors might be hopeful and optimistic, and becoming active in trading securities; leading to an increase in the prices (Rystrom and Benson, 2009).

Pettengill (2003) concurs with the ***Antecedent Reasoning and Attributes*** that the market changes with individual investors. As such, the author purports that investors would be afraid to invest on

Mondays because other traders might have obtained undesirable information during the weekends. Consequently, Condoyanni et al. (2007) resorted to the time-zone model or theory to elucidate the Tuesday effect. Their argument was that the New York stock market had the capacity to influence other markets once its closes its operations on Mondays. As such, other negative impacts on global markets stems from the bad or unfavorable Mondays in the U.S. Jaffe and Westerfield (2015) also favoured in this premise and used it to explain their results.

The ***Tax Selling Model*** has also been used to justify the January effect. According to the model, investors prefer disposing off their securities just in the last weeks of the year to get capital losses due to taxation matters. This pressure and imbalance would cause the prices to decline in December. But, once a new year starts, the pressure would subside and stock prices automatically normalize to the equilibrium level (Elton, 2005). Ritter (1988) also mentioned that investors retain sizeable profits from their end year stock disposal and do no instantly reinvest them. Instead, they wait for January then invest those funds in the stock market, thus leading to a rise in the stock prices due to a demand-driven inflationary pressure.

Sharpe et al. (2009) also stated that "***window dressing***" is a possible factor behind the January effect. It implies that fund manager would offset some of the securities that did not perform to their expectations during the year so as to evade reporting such unprofitable stocks in their annual reports. Once the year begins, the same fund managers would re-invest in well-performing stocks to attract new investors.

Schallheim and Kato (2005) reasoned that ***bonus payments*** would explain the January effect in the Japanese financial markets. Most Japanese firms pay out huge bonuses for their employee in December, and a reasonable fraction of these resources are reinvested in January. This argument coincides with the rationale provided by other researchers including Ritter. Additionally, the release of financial information may also lead to the January effect. A practical case is the end year financial reports that would have spillover effects in January, following year. In all aspects and fairness, this argument is logical because if the news or financial information is beneficial, then they should have some positive effect on the stock returns too.

2.2.7 Time Patterns in Stock Returns

Studies have found varying time patterns that impact on stock returns. Returns on common stocks and bonds are analytically low or high contingent to the calendar dates such as the day of the week, time of the day, month of the year, and week of the month (Arize and Nippani, 2007). However, it the ‘day-of-the-week’ effect that has extensively been studied. A number of studies have established that returns on common stocks are uneven from Monday to Friday. Primary, the findings have shown that, unlike other trading days, Monday’s stock returns are relatively low. Contrarily, most studies involving advanced and emerging markets have established that Fridays produces the highest returns on stocks relative to other days, hence the Friday effect.

Though experienced in nearly all security markets globally, it is evident that the magnitudes of the day-of-the-week effect differs across various stock markets and countries, depending on many factors including the country’s economic status. For instance, Tuesday effect has posted strong negative stock returns particularly in the Asian and European security markets. Though rarely observed in most stock markets, the ‘reversal day of the week effect’ has also been documented in selected markets such as the Greek stock market during the 2010 economic and debt crises (Gibbons and Hess, 2011). It was found that the highest returns on stocks occurred on Mondays while the lowest stock returns were reported on Fridays.

Besides the daily patterns of stock prices that have been widely researched, some monthly patterns have also been documented. One such pattern is the January effect. Empirical evidences tend to point out that January records highest stock returns unlike to other months. In addition to the January effect, intra-monthly effects has been evident in some advanced markets globally. It has been established that, averagely, stock returns are considerably higher during the first two weeks of the month (Rosenberg, 2004).

2.3 Empirical Literature Review

Extensive literature and reports have been documented in an effort to elaborate the effects of calendar anomalies on stock returns in developed and developing markets. Gibbons and Hess (2011) established that stock returns in the U.S. have continuously recorded lower returns on Mondays and considerably high returns on Fridays. Jaffrey and Westerfield (2015), Ajay et al. (2004), and Condoyanni et al. (2007) observed similar trends in emerging stock markets like Portugal and Malaysia. In addition to these past studies, Kato and Schallheim (2005) documented the January effect in the advanced markets. Existing empirical evidences that have been collected overtime also show the presence of the Monday effect and January effects on the bond market of the U.S. Jordan and Jordan (2001) and Nippani and Arize (2007) reported that there existed the Monday effect on corporate bond returns in the New York security market.

2.3.1 Previous Studies

As earlier mentioned, several findings have been published concerning asset prices and time patterns, with the focus being on the developed economies. In the U.S. the Monday effect was first studies by a number of scholars among them, Gibbons and Hess in 1981. The sampled data covered the CRSP and S&P indices for the period from 1962 to 1978. It was established that for the covered period, the annual returns for Mondays averaged -33.5% to -26.8% for S&P 500 and weighted CRSP respectively (Gao and Kling, 2005). Even after dividing the data into sub-periods, they established that, on average, Mondays recorded the least returns compared to other days of the week. Nonetheless, it was only between November 1974 and December 1979 that negative returns on stocks were revealed on Tuesdays. Further, Gibbons and Hess (2011) established that stock returns on Fridays and Wednesdays were considerably high than other trading days. Studies such as that conducted by Lakonishok and Smidt (1998) showed similar outcomes with stock returns on Mondays being negative in the U.S.

The findings of these studies prompted the need for further inquiry into the relationship between calendar dates and stock returns in all markets. Mehdian and Perry (2011) re-examined the Monday effect particularly on the equity markets of the U.S. They used returns obtained from two small-cap and three large-cap indices covering the period 1964-2008. The results of the study revealed that, unlike other trading days, Mondays posted low returns on stocks for most of the period. However, the second sub-period (1987-1997) showed small positive returns only for large-cap indices, but remained negative for the small-cap indices. This made them to conclude that, though still significant, the Monday effect has been declining overtime, especially in developed stock markets (Ogden, 2010).

In addition to the famous weekday anomalies that attracted the attention of the investors and investment specialists, Mehdian and Perry (2011) opted to investigate the monthly patterns in the New York security market for the same period as Mehdian and Perry (2011). Throughout the period, they established that the January effect was strongly evident. It was revealed that stock returns in month of January were not only positive but also significant for all the indices.

However, during the second sub-period (1987-1998), the significance of the January effect was found to be disappearing gradually.

The Monday effect involving four international stock markets got investigated by Jaffe and Westerfield (2015). This study was primarily aimed at proving the existence of the calendar anomalies in the stock returns at the international levels (beyond the boundaries of the U.S. market). Therefore, they examined stock market returns of Canada, Australia, United Kingdom, and Japan. They studied the Nikkei Dow (1970-1983) of Japan, Toronto Stock Exchange Index (1976-1983) of Canada, Statex Actuaries Index (1973-1982) of Australia, and the Financial Times Ordinary Share Index (1950-1983) of the U.K. Their findings were similar to those documented in the stock market of the U.S., except for Japan and Australia. It was found that, like the returns in the U.S., Mondays recorded the lowest returns on stock. Contrary to the U.S., Japan and Australian stock markets documented the lowest average returns on Tuesdays. The results are not different from those published by Gibbons and Hess (2011) and Jaffe and Westerfield (2015) that showed the existence of the negative Tuesday effect but in selected markets.

Notably, disparities were reported in Tokyo Stock Exchange during the 1952-1980 period (Schallheim and Kato, 2005). In principle, there was a general change in January as well as considerable effects in June. The authors observed that there was a possibility that the size of a firm correlated to the gainful return in the period of June mainly for the small ventures of firms.

Documentations of calendar anomalies have been observed in the international realms. For instance, the UK, Canada, Australia, Japan, Singapore and France stock markets from 1969 to 1984. Specifically, the outcome from UK and Canada articulated that weak results on stock returns were observed on Mondays. On the other hand, Japan, Australia, and France recorded negative or weak stock yields on Tuesdays (Condoyanni et al., 2007). Jaffe and Westerfield (2015) also recorded similar findings in their analysis. However, these results were not congruent to the entire European stock markets; for instance the UK and France showed disparities in their returns.

Gu (2006) researched the January effect for equity in Germany, France, Canada, the UK, and Japan in 1970 to 2000. He verified the existence of calendar anomalies or disparities in many months preceding 1990. However, afterwards, all the countries experienced a considerable decline in these effects. Similarly, the research established that the disparity dropped during weak GDP episodes and the reverse was also true. Instinctively, the January effect was recorded as less in the years with high inflation and high in episodes of less inflationary pressure.

The Finnish daily stock market was also investigated by Martikainen and Puttonen (1996). The main index of use was from 1989 to 1990. The approximate yield on the stock return was negative or less than zero for the period, but statistically relevant on Wednesdays and Tuesdays. Hence, there is a high likeness between their findings and those of Jaffe and Westerfied (2015) that showed negative returns on Mondays.

2.3.2 Empirical Studies on the Emerging Markets

The Monday effect in the South Asian stock markets such as South Korea, Thailand, Malaysia, and Philippines was examined by Brooks and Persand (2001). The study period covered 1989-1996 with the major stock index in different nations. The findings articulated that Philippines and South Korea did not have major calendar effects. Contrarily, Thailand and Malaysia recorded substantial stock yields on Mondays but a negative returns on Tuesdays. Further, there was a considerable negative stock returns in Taiwan on Wednesdays (Brooks and Persand, 2001).

Demirer and Baha-Karan (2002) investigated the prospective presence of the Monday effect in the stock market of Istanbul, Turkey between 1988 and 1996. As much as the approximate stock returns were high on particular days of the week or months, there were no statistically adequate reasons to attribute such anomalies to the calendar effects. However, upon examining the autoregressive model, there was a significant result to the effect that the lag variable was steadily high and significant in nature. In principle, this meant that the stock returns of the previous day influenced the following day's performance, thus indicating a measure of inefficiency of the markets.

Ajayi et al. (2004) recorded more confirmations pertaining to the calendar effects, particularly the Monday effect on the emerging security markets. The study transversed eleven main stock markets in Eastern Europe. The duration of examination was from 1990 to 2002. Their immediate findings showed slow or negative Monday yields on stocks in six of the dozen markets and positives on the remaining days of the week. Out of the six studies stock markets studied, the Monday effect was observed in Lithuania and Estonia (Ajayi et al., 2004).

The Global Market Index of the Stock Market in Kuwait showed the monthly trends from a study period of 1894 to 2000 to represent higher significance in July (Al-Saad and Moosa, 2005). In essence, such a phenomenon created a July effect and not any other conventional month such as January. According to Kumari and Mahendra (2006), the day of the week effect in the Indian market from 1979 to 1998 recorded higher stock returns on Mondays. However, Tuesdays recorded or showed a decline in stock returns. April as a month recorded an increase in stock returns than the rest of the months.

Basher and Sadorsky (2006) examined 21 other emerging security markets around the globe and recorded more empirical data on the calendar anomalies, particularly the day-of-the-week effect. The data was recorded from 1992 to 2003 and documented minimal variations in the time delineations. Out of the emerging economies that were analyzed, only Taiwan, Pakistan and Philippines recorded a statistically significant Monday effect. Notably, positive returns were reported on Fridays with negative, slow, or weak Tuesday effect being recorded in Pakistan and a positive return in Philippines on Tuesdays. Nonetheless, these findings differed substantially to those put forth by Brooks and Persand (2001). The variation was that there was no anomaly in stock returns in the Philippines securities market. From 1992 to 1997, there was a slow, negative and weak Tuesday effects in the Chinese securities market, which occasioned anomaly in the computation of the calendar effect (Chen et al., 2001). It is imperative to mention that the negative Monday effect was prevalent and conspicuous in the period after 1995.

2.3.3 Other Studies

Also, there have been considerable calendar anomalies and the day-of-the-week effect in some days in the U.S. Treasury bill market (Gibbons and Hess, 2011). This was evident in the study period 1962-1968. Averagely, stock returns on Mondays were lower than those recorded on Wednesdays. In a similar fashion and comparison, the results were compared with other stock returns across the month. The inference pointed out that stock yields were highest in the second week and lowest in the fourth week of the month. Also, this study by Gibbons and Hess (2011) showed a corresponding January effect. From the cross-sectional comparisons, it was noticed that their patterns and trends were slower, weaker and negative in the later periods of the sampled period.

2.3.4 Capitalizing on Seasonal Effects in the Stock Market

In general, both developed and developing markets are characterized by stock returns anomalies. Empirical studies have established that even in stable capital markets where the securities pricing accurately mirror all historical and relevant information about the stocks, seasonal effects continue to be experienced. For this reason, it is possible beating the market given that technical and fundamental analyses are considered irrelevant in many stock markets.

2.3.5 Monthly Seasonality

Studies that have been conducted in many stock markets globally have confirmed the existence of stock return anomalies on particular months of the year. Arize and Nippani (2007) posited capital markets have historically and consistently experienced better returns during the turn of the year. On the contrary, September has traditionally posted the lowest returns. With exception of the Great Depression period of the 1930s and in 1987, on average, stock returns in October have historically been positive (Arize and Nippani, 2007). Appendix 1 shows the S&P 500 average stock returns between 1926 and 2004.

2.3.6 End of the Year (December) Effect

Usually, most investors dispose their stocks or shares whose prices/returns have been on the decline throughout the year. Such stock sales are commonly done in the last trading month of the year; December. This is done with goal of claiming their capital losses from such investments, thereby booking tax loss. Sharpe et al. (2009) argue that since all rational investors are profit maximizer, it is advantageous minimizing taxes on capital or stock gains. Therefore, it is advisable for the investors interested in buying mutual funds to avoid such purchases unless the December (annual) distributions are made. This would help them ensure that they are not taxed for the capital gains made by the stock throughout the year. However, it has been found that the trading volume increase during the first weeks of January and the last week of the year.

2.7.3 The January Effect

In January, stock investors make a comeback to the bonds and equity markets with aggression and desire to invest with a vengeance of the December losses. Studies conducted by Siegel (2012) titled "*Stocks for the Long Run: The Definitive Guide to Financial Market Returns and Long-Term Investment Strategies*" established that such investment 'gold rush at the beginning of the year results in price surge for value and small cap stocks.

2.3.7 Turn of the Month Effect

Stock market trading varies across the days of the month, hence the term 'turn of the month effect' on stock returns. According to Elton (2005), this concept explains the tendency of stock returns to increase particularly at the turn of each month, and then drop by the middle of the month. In explaining this pattern, Haugen and Jorion (2006) associates this to the significant increase in the money flow at the beginning of each month, which is mostly directed towards mutual funds. A similar upward tendency is occasionally observed at end of the month. This arises from the fact that many investors receive their incomes/earnings either at the beginning or month end. Coupled with the money illusion concept, it is not unique to see increased investments in the stock markets during such periods. To make a kill in the stock market, Sharpe et al. (2009) recommended that investors consider buying stocks in the middle of the month as opposed to the beginning or end of the month. The turn-of-the-month effect indicates that stock returns surge on the closing trading days of month as well as during the first three days of the new month.

2.3.8 The Monday Effect

For decades, the average returns of the stock markets both in emerging and advanced economies have displayed a tendency to decline on Mondays. The *"A Survey of the Monday Effect Literature*" conducted by Glenn Pettengill and published in the *Quarterly Journal of Business and Economics* (Summer, 2003) attributed the Monday drop majorly to the bad news associated with the weekends. Other investment analysts such as Ogden (2010) associated the Monday effect to the gloomy moods of the investors, especially during the morning hours of the Monday stock trading. This can be evidenced by the Dow Jones daily returns between 1985 and 2001. In fact, empirical studies have found that unlike other days of the week, the Monday's average rate of turn on stocks is negative (Summer 2003).

For this reason, investors are better off buying stocks of interest in Mondays given that stock prices are relatively low. However, for those with interest in short-selling, Friday would be the most ideal day for taking short-position since it is the day of the week that stocks are highly priced. Monday would be the best day for covering investment short (Arize and Nippani, 2007).

2.4 Overview of the Literature

Overall, this chapter has covered the theoretical and empirical literature for this study. As pointed out in this chapter, this study is guided by many economic theories with the main ones being the "**Efficient Market Hypothesis,** and the **Random Walk Theory**. However, this is study is primarily founded on the *Efficient Market Hypothesis*. Ideally, financial markets have been found to be efficient given that most of the firms and investors have access to the necessary and most basic information relating to the stock markets. According to this theory, since all the information is made public and available to all investors, they are exhaustively incorporated in stock pricing. Consequently, no investor can beat the market by making excess returns. Under perfectly efficient markets, price changes for stocks are random with the stock prices following the popularly ‘random walk model’.

According to the **Random Walk Theory**, stock returns are known to exhibit a ‘random walk’, thus making it impossible outperforming the market continuously. It is because new information is automatically reflected in the prices of stocks; such that current stock prices reflect the current information. Nevertheless, the prices of the securities are independent of each other on any given day because of the predictability of the new information, hence the theory that ‘stock prices are random.’ According to this theory, stock return changes show a similar distribution, but which are independent of each other, thus evolving in accordance with the random walk. This makes it impossible to depict successive price fluctuations by analyzing the past information or historical price movements of the stock prices. Specifically, the RWH model is founded on the belief that depicting the future stock values cannot provide any substantial information about those future values of securities because such returns are too random to predict with precision as they can either be lower or higher compared to the last observed prices.

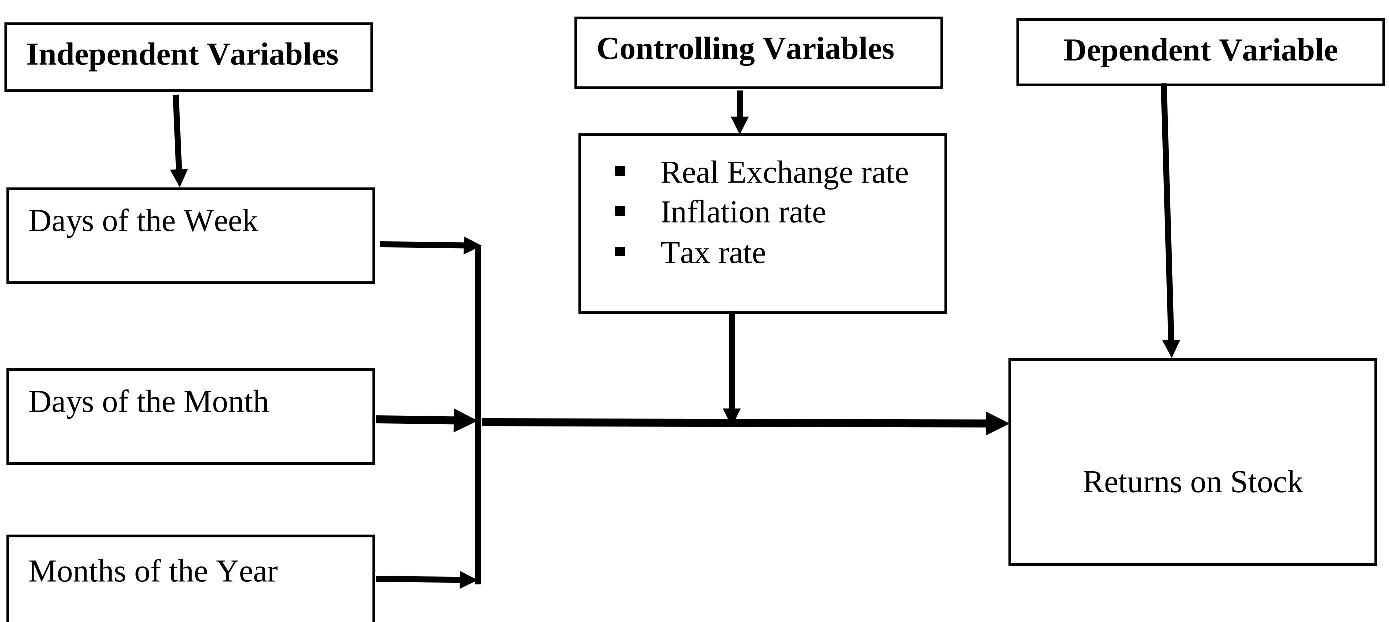
Extensive empirical research has been conducted concerning the effects of calendar anomalies on stock returns globally. In particular, many of these studies have focused on investigating the “day-of-the-week and the month-of-the-year effects.” With respect to the day-of-the-week effects, Gibbons and Hess (2011) established that stock returns of the U.S., Canada, and the U.K.

recorded the lowest returns on Mondays than the rest of the days. Similar patterns have been reported in emerging stock markets such as Malaysia, Portugal, South Africa, South Korea, Taiwan, Thailand, and Brazil among others. On the contrary, Japan, Australia, and France recorded negative or weak stock yields on Tuesdays. The incredible January effect, has been evident in advanced and advancing stock markets across the world. Generally, empirical studies have concluded that the *January effect* is common in both developed and developing stock markets.

2.5 Conceptual Framework

Shields and Rangarajan (2011) defined a conceptual framework as the way ideas are arranged to achieve the objective of the research. It represents analytical tools that are used to conceptualize and organize ideas. Therefore, this conceptual framework provides a visualized relationship between the explanatory (calendar dates) and dependent (stock returns) variables. Additionally, it is the abstract representation of the goals of the study.

Figure 1: The Conceptual Framework



This model has been adapted purposely to aid in analyzing the effects of calendar anomalies on stock returns in Kenya. Essentially, this conceptual framework is significant in examining the objectives of this study. It indicates that stock returns are affected by various calendar and seasonal factors, mainly the day of the week and the month of the year.

2.6 Literature Gap

Osman (2012) studied the holiday effects at the NSE, however, his study mainly focused on the Easter holiday and Idd Ul Fitr. The study found no significant effect of the holiday effects on stock performance at the NSE. Therefore, he concluded that the effects of public holidays on stock returns at the NSE are insignificant. Kingori (1995) investigated stock market seasonality at the NSE, with the primary goal of this study being to examine the existence of the monthly and quarterly seasonality. At the time, only 42 equity stocks that were traded at the NSE got tested. The study found that “NSE mean stock returns are equal over the tested quarters and months.” For this reason, it was concluded that at the NSE, time is never a perfect indicator of stock returns. However, the study did not rule out the impact of time on returns by suggesting that the findings could be possible influenced by the 5-year period covered, which is relatively short in stock markets.

Anyumba (2010) tested the random walk effects for the Kenyan stock market, with the objective of the study being determining whether or not the NSE obeys the EMH theory. The study period was between 2004 and 2009. The study utilized the Bachelier (1990) model for testing the random walk effect. It was found that the stock returns at the NSE obey the efficient market hypothesis but only the weak form efficiency was found to be relevant. Obere (2009) also tested the market efficiency theory by analyzing the daily stock returns at the NSE. As well, this study examined the seasonality of stock returns in Kenya using linear-model and the ARCH model. However, the former model has been found to be unsuitable for testing stock returns owing the fact that stocks are highly volatile in nature. Concerning calendar anomalies, Obere seasonal effects are only evident in the event that sufficiently large periods are examined, otherwise irrelevant for short periods; though he did not specify what constitute large or short periods. Contrarily, the same study found that the Monday effect was absent while the January month effect was evident but very weak. On the contrary, Obere found that quart-of-the-year effect was very strongly evident in the NSE. However, the study recommended that it would be more reliable applying short-estimation methods given that longer-estimation alternatives are often affected by data smoothing. Notably, many of these studies only concentrated on testing the holiday and the size effects. But, methodological gaps have been pointed out in more than 80% of these studies.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the theoretical and empirical frameworks that guided the study are discussed. The chapter specifies the models used findings of the study. Also, chapter outlines data type and sources, and estimation procedures, and diagnostic tests.

3.2 Theoretical Framework

This study applied the Markov Regime-switching model (MRS), in trying to bring out the economic importance of regimes (pre-reforms and post-reforms) calendar anomalies in the NSE. To measure the economic significance of regimes, Guidolin and Timmermann (2008) used an out-of-sample performance of a variety of model specifications including regime-switching, and single-state. Despite the existence of various regime switching models in economics Chu et al. (2004) demonstrated that the MRS model is the most appropriate alternative to estimate subject to regime shifts. This study adopted the MRS model and further incorporates to Tang (1997) approach in analyzing the calendar anomalies in NSE. In trying to explain the day of the week effect Tang (1997) developed two hypotheses. The first hypothesis includes the Calendar Time Hypothesis (CTH) which depicted that the return generating is a continuous process, implying that the average return on Monday is different from other day's return because it is estimated from the Friday's closing prices hence it is likely to be three times higher than the other days. The second hypothesis, the Trading time Hypothesis (TTH) postulates that the returns of ordinary shares are produced during transactions, implying that the mean return of shares is likely to be the same for all the days of the week (Monday to Friday) since the returns for each day represent each day's investments.

On the other hand, the analogy of the January effect was based on the hypothesis that stock companies tend to generate higher returns in the beginning weeks of January Ligon (1997). The explanation for this is that investors sell stocks in December and buy back in January because of the Tax-loss Hypothesis.

3.3 Empirical Model Specification

The empirical aspect for this study was established from the Markov regime -switching model. The model is based on generating a simple dummy variable approach which provides a statistical method of segmenting the sample data into different regimes through probabilistic inference. In other words, the model helps to derive the probability of the return of a given month belonging to a certain regime (Chu et al., 2004). The model does not assume the number of regimes, but it is estimated depending on the data. For instance, assuming that the universe of possible occurrence is split into K states or regimes called St, with t = 1,..., K, the shift of St between regimes was ruled by the Markov process.

$$P(\alpha < y_t \leq \beta / \, y_1, y_2 \ldots . y_{t-1}) = P(\alpha < y_t \leq \beta / \, y_{t-1}) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots ..1$$

The above equality states that if a variable follows a first-order Markov chain, only the current period's probability and a transition matrix was necessary to forecast the probability of that variable being in a given regime during the next period. From this, a vector of current state probabilities obtained and defined as follows:

$$\pi_t = [\pi_1, \pi_2, \ldots, \pi_m] \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 2$$

Where πi is the probability that the variable is currently in regime i. Thus, given the current period's probability and the transition probabilities matrix P, the probability that the variable was in each regime next period is defined as:

$$\pi_{t+1} = [\pi_t P] \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .3$$

When the number of regimes is determined, the frequency distribution of high return regimes is examined to discern the presence of the relevant anomalies. The model's parameters can be estimated using the maximum likelihood approach.

In addition, this study adopted Vaihekoski (2004) arguments that stock returns tend to follow a normal distribution pattern. As such, it was important to compound both daily and month returns for the NSE-All share index; computed as:

$$\mathbf{R_{it}} = \ln\left[\frac{\mathrm{P_t}}{\mathrm{P_{t-1}}}\right] \mathrm{X}\, 100 \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \ldots \ldots \ldots 4$$

Where, $\mathbf{R_{it}}$ return on stock index ***i*** at period ***t***, $\boldsymbol{P_t}$ represents the closing stock price in period ***t***, and $\boldsymbol{P_{t-1}}$ is the closing stock returns for period ***t-1*** (the previous period).

3.4 Estimation Techniques

3.4.1 The Day of the Week Effect or the Monday Effect

In examining the Monday effect, this study made use of the following model:

$$R_{it} = \alpha_{1i} D_{1t} + \alpha_{2i} D_{2t} + \alpha_{3i} D_{3t} + \alpha_{4i} D_{4t} + \alpha_{5i} D_{5t} + \varepsilon_{it} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots 5$$

In this model, R_{it} is returns on stock on day t, D_{1t} represents the dummy variable for Monday (which takes assumes 1 for Monday observations), D_{2t} through to D_{5t} represent dummy variables for Tuesday to Friday (which also take the value 1 if observed or 0 if otherwise). α_i is the coefficients of estimators for each of the days of the week, while ε_{it} is the error term (or the disturbance term). The estimation is subjected to MRS model with two periods, pre-reform and post reform. The null hypothesis (**H_0**) that was tested includes:

$$\mathrm{H}_0 = \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = (0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.\ldots..6$$

The alternative hypothesis (**H_1**) for the study was:

$$H_1 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq (0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots7$$

From the H_0, it is assumed that the Monday effect is statistically insignificant, implying that $\alpha_i = 0$) or nearly 0. Therefore, the F-value must be statistically insignificant. In case this is found to be true, the alternative hypothesis (H_1) was not accepted. If the H_1 is accepted, this would imply that the stock returns exhibit the concept of the day-of-the-week seasonality, hence the F-value was significant statistically.

3.4.2 The Month of the Year Effect or January Effect

To test for the existence of the monthly patterns and anomalies in stock returns in the NSE, a nearly identical model was constructed. Mehdian and Perry (2011) used a similar model when studying the holiday effects on the Australian stock market. In particular, the linear regression model for this study took the form of:

$$R_{it} = \beta_{1i}M_{1t} + \beta_{2i}M_{2t} + \beta_{3i}M_{3t} + \ldots + \beta_{12i}M_{12t} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.8$$

Where R_{it} represents the average monthly stock return for index *i*, M_1 through M_{12} represent dummy variables for the twelve months (which take the value 1 for monthly observations, otherwise 0). β_1 through β_{12} are coefficients for estimating monthly returns from January to December, while ε_{it} represents the disturbance/error term of the model.

As the case January effect, the H_0 that there is zero statistically significant difference in the average monthly returns on the stocks at the NSE was estimated as:

$$H_0 = \beta_1 = \beta_2 = \beta_3 = \cdots\cdots\cdots\cdots\cdots = \beta_{12} = (0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 9$$

The alternative hypothesis (**H_1**) for the study was:

$$H_1 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \cdots\cdots\cdots\cdots \neq \beta_{12} \neq (0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .10$$

If the H_0 is accepted, then the F-value had to be statistically insignificant. In case this is found to be true, the alternative hypothesis (H_1) was not be accepted. If the H_1 is accepted, this would imply that the stock returns exhibit the concept of the month-of-the-year anomalies, thus the F-value would be statistically significant.

3.5 Data Source, Type, and Sample Size

This study relied on primary data collected from the NSE. The study used the average closing daily, monthly, and weekly stock returns data of the NSE-all-share index. The choice of the NSE-all-share index was based on the belief that it represents the market value weighted index for the entire NSE stock market capitalization. The data period ranged from January 1, 2010 to Dec. 31, 2015; and from January 1, 2016 to Dec. 31, 2017 for the post reform analysis. This ensured adequacy in the number of observations are included in the study; with n>1000. This was a panel data since the data on the variables of the study are taken from specific periods and pooled together into two categories. Specifically, the data was sourced from the Nairobi Securities Exchange website and stock registry. The research used daily stock returns in testing for the Monday effect, while average monthly returns was used for examining the January effect. Unlike many past studies, this research used the NSE-all-share index rather than the NSE-20-share index.

3.6 Diagnostic Tests

As Brooks (2002) pointed out, the use of classical linear regression model is founded on three main assumptions. These include lack of autocorrelation of the residuals, homoscedasticity of the residuals (constant variance), and normality of the distribution. In the event the three assumptions are not satisfied, other appropriate methods of estimation was introduced, e.g. the use of Generalized Least Squares (OLS) and Heteroskedasticity procedures were preferred. Notably, most past studies have relaxed these assumptions to use OLS-approach for testing for the anomalies in stock returns. Among them include Ajay et al. (2004), Gibbons and Hess (2016), and Brooks (2002) who preferred the OLS as the most basic approach for analyzing stock returns calendar anomalies. In this regard, the following diagnostic tests were carried out.

3.6.1 Normality Test

This test was mainly used to determine whether or not the data set for the analysis was extracted from a normally distributed population, but with some degrees of tolerance. Most statistical tests such as the two-way and one-way ANOVA are normally carried out on normally distributed sample data. Such tests were also done to test the normality of the residuals. From the theoretical point of view, the residuals are expected to be normally distributed. Additionally, the Anderson-Darling test was applied in determining the normality of the distribution.

3.6.2 Heteroscedasticity Test

Though there are numerous methods that can be in testing for the heteroskedasticity, this study used the White's test and modified Breusch-Pagan test, which was advanced by Adrian Pagan and Trevor Breusch. The Breusch-Pagan test for heteroskedasticity is founded on the postulation that the variance of the error term varies with the regressors. If detected, variable transformation methods such as Box-Cox transformation approach was used to rectify the effect of heteroskedasticity. However, if the causes of the heteroskedasticity are known with certainty, the weighted least squares method was used to correct it. Notably, it is the latter that was preferred for this study.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the results from data analysis as well as the discussion of the results. The chapter of the descriptive statistics, diagnostics tests, and the model to achieve the study objectives.

4.2 Descriptive Statistics

The descriptive statistics give a summary of the statistical properties of the study variables. They are presented in tabular form for both monthly and weekly effects, post and pre-reforms. The mean shows the average values for the study variables while the standard deviation shows the variable observation vary from the mean. It is a measure of dispersion of the observation distribution. Other descriptive elements of the study include standard deviation, extreme values of minimum and maximum, standard deviation, skewness, kurtosis, and coefficient of variation.

4.2.1 Descriptive Statistics by the day-of-the-week

Table 4.1: Descriptive statistics for the days of the week Pre-Reform

DAY	Min	Max	Mean	SD	Skewness	Kurtosis	CV
FRIDAY	97.3	173.14	142.1251	16.7713	-.2871877	2.789929	.1180038
MONDAY	95.55	176.82	142.1768	17.10768	-.3365686	3.03244	.1203269
THURSDAY	102.95	175.7	142.1853	16.17718	-.2731968	2.806125	.1137753
TUESDAY	101.03	174.7	142.2557	16.3291	-.2992178	2.83313	.1147869
WEDNESDAY	98.91	176	142.1314	16.54473	-.3377635	2.857744	.1164045

Table 4.2: Descriptive statistics for the days of the week Post-reform

DAY	Min	Max	Mean	SD	Skewness	Kurtosis	CV
FRIDAY	96.07	194.86	154.115	19.87763	-.2753131	2.409672	.1289791
MONDAY	101.02	193.06	154.1581	19.62697	-.2484322	2.309288	.1273171
THURSDAY	103.5	196.57	154.3033	19.47733	-.1795467	2.222223	.1262276
TUESDAY	105.39	193.2	154.4599	19.4518	-.2282712	2.248047	.1259343
WEDNESDAY	102.45	194.16	154.0674	19.45187	-.1856953	2.245275	.1262555

The mean values show that the stability of the returns in the entire week varying with decimals with the highest weekly stock returns was on Tuesdays and Thursdays with 148.2076 and 148.306 respectively. Wednesday had the lowest mean value of the 148.1601. The standard deviation was the greatest on Monday with 19.34227 followed by Friday with 19.33099. This implies that the variation of the stock returns was highest in the two days of the week which is an indication of the level of fluctuations. The rest of the days of the week the stock returns remained stable with no significant variations from the mean.

The extreme values of the minima and maxima show the least and highest achievable values of the stock return in the course of the different days of the week. The least value of the stock returns was on Monday with 95.55 while the largest minimum was Thursday (102.95). The maximum shows the highest achievable values of the observations. Thursday had the highest possible stock returns of 196.57 and Monday had the least large (193.06) in the five trading days of the week.

Skewness and Kurtosis show how the observation of the variables are distributed in relation to the normal distribution. Positive values indicate that the variable observations are distributed to the right while the negative values show skewness to the left. The presented values show that all the variable observations were skewed to the left. However, kurtosis shows the peakedness of the distribution in relation to the normal distribution and high positive values show the high risks to the investment especially in investments. The coefficient of variation also be called R squared which shows the proportion of the changes explained by the variables of the study.

4.2.2 Descriptive Statistics by Monthly Effects (January Effect)

Table 4.3: Descriptive statistics for the monthly effects Pre-reform of 2015

Month	Min	Max	Mean	SD	Skewness	Kurtosis	CV
APR	104.09	175.11	144.8105	21.34232	-.5396038	1.980882	.147381
AUG	95.55	166.81	140.0598	20.03139	-.6501836	2.343975	.1430203
DEC	130.9	165.58	148.0296	11.71159	.1388308	1.432811	.0791166
FEB	115.64	165.45	142.0694	13.70454	-.2714789	1.986493	.0964637
JAN	97.55	152.27	132.8612	15.80545	-.7436904	2.167178	.1189621
JULY	130.42	156.43	145.0471	6.50168	-.3050361	2.290113	.0448246
JUNE	132.17	175.81	150.9778	13.69141	.6182171	1.816624	.0906849
MAR	97.3	176.82	144.8297	18.09157	-.2995544	3.15521	.1249162
MAY	116.31	172.45	144.636	16.05328	-.0986054	1.764828	.1109909
NOV	115.44	156.68	138.0979	12.19528	-.4575901	1.673711	.088309
OCT	98.91	162.89	134.6195	15.89592	-.504299	2.800487	.1180803
SEP	115.48	176	143.1328	20.04115	.382473	1.66657	.1400179

Table 4.4: Descriptive statistics for the monthly effects Post-Reform of 2015

Month	Min	Max	Mean	SD	Skewness	Kurtosis	CV
APR	130.51	192.82	153.177	21.46157	.5976503	1.650861	.1401096
AUG	131.56	174.71	158.4098	14.61762	-.548157	1.682401	.0922772
DEC	127.22	174.17	152.2882	16.40211	.209017	1.407841	.1077044
FEB	122.23	182.16	152.0039	23.62075	.0321342	1.384041	.1553957
JAN	121.26	181.91	162.3231	22.6421	-1.029481	2.29094	.1394878
JULY	115.33	174.11	150.2548	20.27982	-.3613277	1.586863	.1349695
JUNE	101.02	178.21	146.3225	25.85641	-.4299887	1.726738	.1767084
MAR	119.62	196.57	152.4754	27.61907	.5231277	1.575276	.1811379
MAY	96.07	179.25	150.5183	19.48413	.2450418	2.175783	.1294469
NOV	140.88	176	159.6139	11.9305	-.1744157	1.455901	.074746
OCT	141.78	171.67	156.0052	8.241952	-.4155738	1.704426	.0528313
SEP	144.36	166.76	155.8278	6.772057	.2862223	1.560562	.0434586

The above table shows the statistical properties of the variables as discussed above but for the monthly stock returns. The mean value shows that the returns varied from one month to the other as evident by the fluctuations. December had the highest stock returns within the years studied with 150.2052 and the lowest mean value was in the month of October which was 145.3123. The indication is that stock returns performed relatively well in the month of December as compared in the other months of the year. The fluctuations are clearly shown by the upswing and downswing in the several of the year with December being the best month and October being the worst month of the year.

The maximum values was experienced in the month of March and April with 145.3123 and 192.82 respectively which showed the best performing days of the stock returns of the month. The least values shown by minimum column was in the month of August and May which were 95.55 and 96.07 respectively.

Stock returns in the month of the February, March, April, May, and December had positive values of the skewness implying a distribution to the right while the negative values show the leftward distribution of the variable observations in the rest of the month of the year. Kurtosis posted positive values for all the month shows the increased level of the risk exposure for the stock investments and the highest values show the highest level of the exposure. The coefficient of determination of the proportion of the changes in the model explained in the model by the variable so the study.

4.3 Diagnostic Tests

4.3.1 Multicollinearity for Days of the Week Pre-Reform

Table 4.5: Multicollinearity test results for days of the week

Variable	VIF	1/VIF
MONDAY	1.61	0.622665
THURSDAY	1.60	0.624786
TUESDAY	1.60	0.625863
WEDNESDAY	1.60	0.624786
Mean VIF	1.60	

Multicollinearity refers to a case in which the independent variables are related to each other and this causes bias in the results of the study. This is tested using the variance inflation factor (VIF) where the VIF values greater than 8.0 indicate the presence of Multicollinearity while values less than 8.0 indicate the absence of the multicollinearity. Since all the VIF for all the days of the week are less than 8.0 and averages 1.6, it implies that independent variables are not interrelated, hence no multicollinearity effects.

4.3. 2 Heteroskedasticity Pre- Reform for Daily of the Week Effects

Table 4.6: Heteroskedasticity Pre- Reform for the day of the week effect

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stock

         chi2(1)      =     0.09
         Prob > chi2  =   0.7592
```

The study proceeded to test for the presence of the heteroscedasticity on the null hypothesis of the constant variance against the alternative hypothesis and the results were presented the above table is an indication that there was no heteroscedasticity.

4.3.2 Monthly Pre-reform Test

Table 4.7: Multicollinearity for months of the year Pre-Reform

Variables	VIF	1/VIF
AUG	1.94	0.514970
DEC	1.69	0.590826
FEB	1.93	0.518558
JAN	1.87	0.533563
JULY	1.97	0.507979
JUNE	1.83	0.545551
MAR	1.94	0.514970
MAY	2.01	0.497932
NOV	2.06	0.485300
OCT	1.98	0.504573
SEP	1.87	0.533563
Mean VIF	1.92	

This study also sought to find out the presence of multicollinearity for the monthly stock returns and the above table provides the results. The mean VIF was way much less than 8.0 at 1.92, hence indicating that stock returns in each month did not depend on each other.

Pre-reform Heteroskedasticity for Months of the Year

Table 4.8: Heteroskedasticity for months of the year pre-reforms

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stock

         chi2(1)      =     0.62
         Prob > chi2  =   0.4319
```

Similarly, the study tested for the presence of heteroscedasticity for the monthly stock returns and the p value of 0.8127 shows that there is no heteroscedasticity. Therefore, the conclusion that the variance was constant for all the months of the year.

4.3.3 Days of the week Post-Reform Tests

Table 4.9: Multicollinearity test for days of the week post-reforms

Variable	**VIF**	**1/VIF**
MONDAY	1.60	0.623746
THURSDAY	1.60	0.624791
TUESDAY	1.60	0.624791
WEDNESDAY	1.60	0.624791
Mean VIF	1.60	

Table 4.10: Heteroskedasticity test for the day of the week effect post-reforms

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stock

         chi2(1)      =     0.02
         Prob > chi2  =   0.8816
```

4.3.4 Monthly Post-reform Tests

Table 4.11: Multicollinearity tests for monthly effect post the reforms

Variables	VIF	1/VIF
AUG	1.97	0.508393
DEC	1.71	0.584929
FEB	1.91	0.522409
JAN	1.86	0.537437
JULY	1.97	0.508393
JUNE	1.85	0.541364
MAR	1.93	0.518814
MAY	2.01	0.498488
NOV	2.08	0.480084
OCT	1.97	0.508393
SEP	1.89	0.529790
Mean VIF	1.92	

Table 4.12: Heteroskedasticity Test for the monthly effects post-reforms

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of stock

         chi2(1)      =    32.35
         Prob > chi2  =   0.0000
```

4.4 Pooled OLS (Without Market Condition)

Table 4.13: Days of the week OLS Regression results

Days	Pre-Reform Stock	Post- Reform Stock
FRIDAY	0.0517	0.0266
	(1.976)	(1.588)
THURSDAY	0.0603	0.125
	(1.928)	(1.574)
TUESDAY	0.131	0.260
	(1.940)	(1.578)
WEDNESDAY	0.00630	-0.0209
	(1.950)	(1.578)
Constant	142.1***	148.2***
	(1.388)	(1.125)
Observations	731	746
R^2	0.000	0.000
F	0.00148	0.0109
df_m	4	4
df_r	726	742

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The first weekly model has the effects of the each day of the week on the stock returns in Kenya in assessing the stock returns anomalies. The constant in this model showed that the average weekly returns did not have any significant effect on the overall stock performance in Kenya. Apart from the Wednesday effect which had a negative and insignificant effect on the overall stock performance in Kenya, the rest of the days which include Tuesday, Thursday, and Friday have positive and insignificant effect on the stock market performance. Average stock returns reduce the market stock performance by 0.0209 though insignificantly. Average returns on stock on Tuesday, Thursday and Friday cause an increase in the market stock performance by 0.260, 0.125 and 0.0266 respectively. Therefore, the weekly effect is defective to the stock market performance.

Table 4.14: Monthly OLS Regression Results

MONTHS	PRE- REFORM STOCK	POST-REFORM STOCK
AUG	-4.751	0.417
	(3.807)	(2.679)
DEC	3.219	1.174
	(3.339)	(2.532)
FEB	-2.741	-1.994
	(3.339)	(2.712)
APR	-11.95^{***}	-1.439
	(3.525)	(3.052)
JULY	0.237	-1.360
	(2.962)	(2.440)
JUNE	6.167	-0.422
	(3.395)	(2.836)
MAR	0.0191	-0.378
	(3.650)	(2.929)
MAY	-0.175	-1.432
	(3.452)	(2.559)
NOV	-6.713^{*}	0.0446
	(3.193)	(2.439)
OCT	-10.19^{**}	-3.718
	(3.458)	(2.500)
SEP	-1.678	0.557
	(3.878)	(2.524)
Constant	144.8^{***}	149.0^{***}
	(2.850)	(2.042)
Observations	731	746
R^2	0.090	0.005
F	8.240	0.787
df_m	11	11
df_r	719	742

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The second regression presents the effects of each monthly average returns on the stock market performance at the NSE. The regression for the entire twelve months has a low R^2 of 0.005 which implies that only 0.5 percent of the stock performance is explained by the monthly stock returns. The average stock on September (0.557), November (0.0446), December (1.174) and

August (0.417) had positive but insignificant effect on stock performance post reforms of 2015. These were not any significant or different from those results posted pre-reforms of the 2015.

The average stock on the other months had a negative and insignificant effect on the market stock performance at the NSE. The specific monthly effect for October (-3.718), May (-1.432), March (-1.432), June (-0.422), July (-1.360), April (-1.439) and February (-1.994) showed the average effects on stock performance which was negative and insignificant. The implication is the defectiveness of each month's effects on the stock performance both pre and post the reforms of 2015.

Market Condition Effect Regression (Day of the Week Effects)

Further, the study estimated the regression for market condition before and after the reforms in the NSE particularly for the day-of-the-week effects. The results are presented in the table below.

Table 4.15: Days of the week effect regression results

DAYS OF THE WEEK	PRE-REFORM STOCK	POST-REFORM STOCK
FRIDAY	0.0515	0.0394
	(0.452)	(0.535)
THURSDAY	0.0596	0.202
	(0.300)	(0.499)
TUESDAY	0.222	0.274
	(0.587)	(0.514)
WEDNESDAY	-0.188	0.0102
	(0.549)	(0.758)
Constant	142.3^{***}	154.1^{***}
	(1.540)	(1.339)
Observations	731	746
Number of groups	5	5
Wald chi2(0)	0.93	8.04
Prob > chi2	0.9204	0.0900

Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The day-of-the-week effect show that pre-reforms of 2015, stock returns at the NSE was positively affected and high on Tuesday (0.0515), Thursday (0.0596), and Friday (0.222) although the effects were statistically insignificant. Wednesday's returns caused a negative but insignificant to impact the stock market performance and insignificantly reduce the stock performance by 0.188.

Similarly, the post-reform model shows that the day-of-the-week effect was insignificant although positive for all the days. However, like was the case pre-reforms, the average stock returns were highest on Tuesdays (0.274), followed by Thursdays (0.202) and lowest on

Wednesdays (0.0102). Therefore, it implies that the reforms of 2015 did not contribute significantly to making the NSE more efficient as was intended by the CMA.

Table 4.16: Monthly effect regression results

	PRE- REFORMS	POST-REFORMS
AUG	-4.751***	5.233***
	(6.85e-14)	(3.93e-14)
DEC	3.219***	-0.889***
	(6.89e-14)	(4.22e-14)
FEB	-2.741***	-1.173***
	(6.84e-14)	(3.87e-14)
JAN	-11.95***	9.146***
	(6.95e-14)	(3.65e-14)
JULY	0.237***	-2.922***
	(6.94e-14)	(3.91e-14)
JUNE	6.167***	-6.855***
	(7.10e-14)	(4.42e-14)
MAR	0.0191***	-0.702***
	(6.91e-14)	(3.69e-14)
MAY	-0.175***	-2.659***
	(6.86e-14)	(3.68e-14)
NOV	-6.713***	6.437***
	(6.89e-14)	(3.44e-14)
OCT	-10.19***	2.828***
	(6.92e-14)	(3.64e-14)
SEP	-1.678***	2.651***
	(6.88e-14)	(4.81e-14)
Constant	144.8***	153.2***
	(6.84e-14)	(3.41e-14)
Observations	731	746
Number of groups	12	12
Wald chi2(0)	0.8504	23.04
Prob > chi2	0.004	0.0700

Standard errors in parentheses * *p* < 0.05, ** *p* < 0.01, * *p* < 0.001**

From the monthly effects results, increase in the return significantly and negatively affect stock performance by 4.751 at 1% level of significance before the 2015 reforms, particularly for the month of August. On the other hand, it causes increases the stock market performance by 5.233

at 1% level of significance after the reforms. This shows the monthly effect in the month of August post the reforms. December average return increased the stock performance at NSE by 3.219 in the pre-reform period while it reduced the stock performance by 0.889 post reforms. Hence, the effect is very significant for August at 1% level of significance.

February's average stock returns performance had negative effect and significant both in the pre-reform and post-reform periods. Unit change in the average returns causes a reduction in the stock market performance by 2.741 and 1.173 in the pre-reform and post-reform periods respectively at 1% level of significance. January had a negative effects on stock performance during the pre-reform period by 11.95 but changed to positive post the 2015 reforms 9.146.

For the month July, there was a positive influence on stock returns by 0.237 pre-reforms but post-reforms, this was negative by 2.922 at 1% significance level. The pattern as July was exhibited during the months of June and March for both pre and post-reforms, though the figures were slightly higher for June but lower for March compared to July. May was a unique month as the effects remained negative both the pre-reform and post-reform periods. Changes in the average stock returns in the month of May insignificantly negative by 0.175 and 2.659 in the pre-reform and post-reform periods respectively. For the month of November, the average stock returns was equally negative by 6.713 in the pre-reform period but changed positive in the post-reform period by 6.437 at 1% level of significance.

Average stock performance was observed to be positive in the month of October after the 2015 reforms. Stock returns increased the market stock performance by 2.828 in the post-reform period while in the pre-reform period reduced the market performance by 10.19 at 1% level of significance. Similarly, there average returns in the month of September negatively and insignificantly affected the stock performance at NSE. Contrary to the tax-loss sale hypothesis, the average stock returns in the month of December post the 2015 reforms was highest and positive and but lower in January. This implies that the reforms by the CMA did not effectively weed-out the January effects, which is anomaly. In fact, the January effect was not even clearly evident in the study findings.

4.5 Estimation Equations

From this study findings, the following equations can be generated in line with chapter 3 estimations:

4.5.1 The Monday or day-of-the-week effects

The day-of-the-week effect or Monday Effects:

$$R_t = a\,D_{1t} + 0.222D_{2t} - 0.188D_{3t} + 0.0596D_{4t} + 0.0515D_{5t} + 142.3 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . 11$$

Post-reforms Equation for the day of the week effect:

$$R_{t+1} = aD_{1t} + 0.274D_{2t} + 0.0102D_{3t} + 0.202D_{4t} + 0.0394D_{5t} + 154.1 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . \dots .12$$

Where $D_{1t}, D_{2t} \dots\dots\dots\dots . D_{5t}$ represents Monday through to Friday.

Since $H_1 \neq \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq (0) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . . \dots\dots\dots\dots\dots 13$

Therefore, the alternative hypothesis (**H_1**) is accepted at the expense of the null hypothesis that the presence of day-of-the-week effect is not statistically significant pre and post the 2015 reforms at the NSE.

4.5.2 Monthly Effects or the Incredible January Effects

Pre-reforms Equation:

$R_{it} = -11.95M_{1t} - 2.741M_{2t} + 0.0191M_{3t} + \ldots + 3.219M_{12t} + 144.8 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .14$

Post-reforms Equation:

$R_{it} = 9.146M_{1t} - 1.994M_{2t} - 0.702M_{3t} + \ldots + 1.174M_{12t} + 149.0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 15.$

Where $M_{1t}, M_{2t}, \ldots\ldots\ldots M_{12t}$ represents the 12 months of the year from January through to December.

Since $H_1 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \cdots\cdots\cdots\cdots \neq \beta_{12} \neq (0) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots ..16.$

Thus, the study accepted the alternative hypothesis (H_2) that the incredible January effect's presence is not statistically significant pre and post the 2015 reforms at the NSE.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section provides the summary o and conclusion which summarizes how the study objectives have been achieved, policy recommendations based on the study findings and concludes by proposing further areas for research in this field.

5.2 Summary and Conclusion

The first objective of this study was to determine the existence of calendar anomalies at the NSE pre and post the 2015 stock market reforms initiated by the CMA. This was achieved by carrying out day of the week effects model and monthly effect model analyses. The study of regressions on monthly and day of the week effects showed that some months experienced enhancement on the stock performance as well as the monthly effects. The study found some elements of variations with some affecting the stock performance positively and others negatively though the overall effects for all the months were statistically insignificant to effect seasonality in stock returns at the NSE. It was unusual for monthly returns to have negative effects on the stock performance before reforms of 2015 when it was expected that they should be positive for months like January in accordance with the 'incredible January effect'. Specifically, December, February, July, June, March, and May had negative results for the monthly effect even pre the 2015 reforms. However, other months displayed some normality and positive returns on stocks performance before reforms.

The second objective of the study was to examine whether the 2015 stock market reforms by the CMA played a significant role in eliminating stock return inefficiencies at the NSE. The study findings regarding the day of the week (Monday) effect established that there was no statistically significant effects of the returns on stock investments at the NSE even after the institutional, operational, and structural reforms initiated by CMA. Post the 2015 reforms, the average returns during the months of December, February, July, June, March, and May were found to negatively but insignificantly affected stock returns at the NSE. The rest of the months January, April, May, October, November, and August reported positive returns but were not statistically significant to confirm the presence of the month of the year and the January effects. Based on the findings of the study, the study concluded that the reforms of 2015 at the NSE did not eliminate market inefficiencies as intended by the CMA. Also, the findings for the Monday effect and the incredible January effects for this study were not conclusive to deduce that the NSE operates in accordance with the EMH by Eugene Fama (Fama, 1965). Instead, the performance of the stock returns kept fluctuating from Monday to Friday as well as throughout the year from January to December before and after the 2015 reforms, which justifies the Random Walk Hypothesis advanced by Burton.

5.3 Policy Recommendations

First, the study showed that there were a several of months that experienced positive average returns on stocks especially post the 2015 reforms, but there were inconsistencies still. Consequently, this study recommends that more evidenced-based reforms should be introduced at the NSE. These reforms should also be matched with modern technologies to create efficiency in the stock market operations and eliminate inefficiencies at the NSE.

Secondly, the study established that months like January, April, May, October, November and August had positives returns on stock investments at the NSE. Therefore, this study recommends that stockbrokers and capital market investors should take advantage of such positivity months and make a kill from the stock market investment.

Finally, the study established that the daily-of-the-week effect did not have any statistically meaningful impact on stock returns and performance before and after the reforms. For this reason, the CMA should reconsider its reform strategies in order to reduce stock return volatilities and inefficiencies observed from Monday to Friday throughout the study period at the NSE.

5.4 Limitations of the Study

The major limitation for this study was the fact that it only used NASI for data collected from January 2010 to December 2017. As recommended by the Obere (2009) study, large data sample size covering many years increases the level of accuracy of the findings. Besides, the cost for acquiring the data from the NSE data department was quite high, hence economically straining and limited the volume of data the researcher could afford and access.

5.5 Further Areas for Research

From the limitation of this research, it is suggested that more studies be conducted to cover wide periods and factor-in all the reforms that have been introduced at the NSE since its formation to date. Also, further studies should focused and analyze the role election periods on the stock returns at the NSE.

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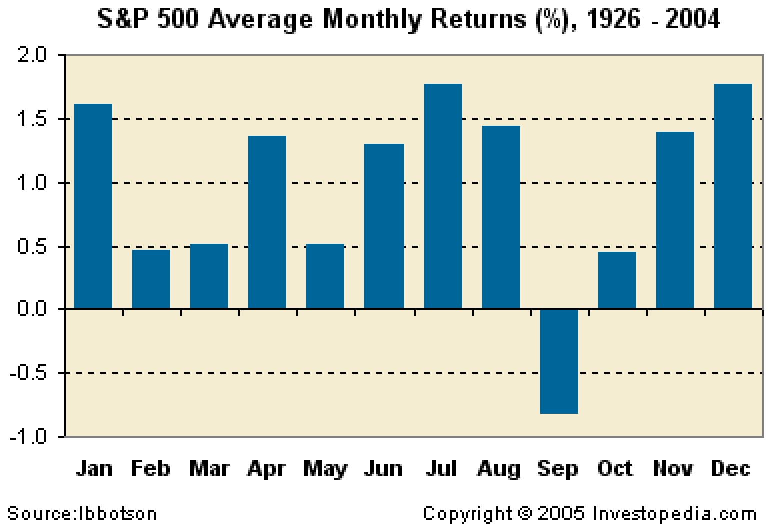
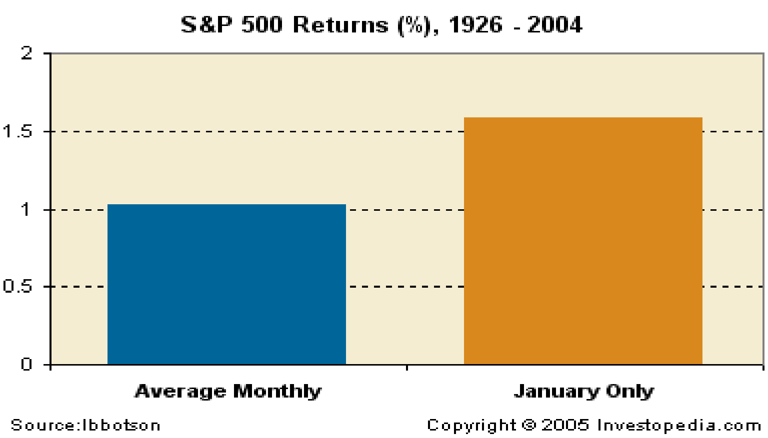
APPENDICES

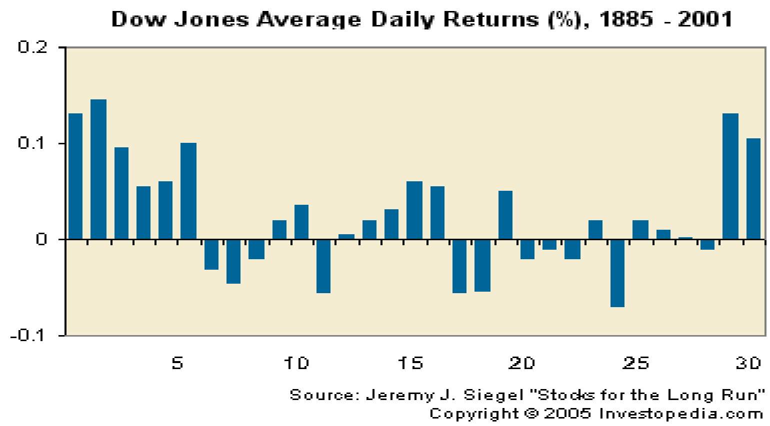
Appendix 1: *Monthly Effect*



Appendix 2: *The January Effect*



Appendix 3: ***Turn of the Month Effect***



Appendix 4: ***The Day of the Week Effect***