EFFECT OF ENERGY REGULATORY COMMISSION'S ANNOUNCEMENTS ON STOCK RETURNS OF FIRMS IN THE PETROLEUM AND ENERGY SECTOR AT THE NAIROBI SECURITIES EXCHANGE

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DECLARATION

I hereby declare that the work presented in this document is my original work and has not been presented in any other university for the award of a degree neither has any part of it been reproduced, reprinted or availed to others in any form.

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DEDICATION

To my family, the nucleus with which the universe conspired to help me achieve my study objectives. I dedicate this work to my Mum for her unrelenting moral support, prayers and guidance.

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List of Abbreviations and Acronyms

AR – Abnormal Returns

CAPM – Capital Assets Pricing Model

CAR – Cumulative Abnormal Returns

CAAR – Cumulative Average Abnormal Returns

CMA – Capital Market Authority

CMAR – Cumulative Mean Abnormal Returns

EMH – Efficiency Market Hypothesis

ERC – Energy Regulatory Commission

EWP – Equally Weighted Portfolio

GDP – Gross Domestic Product

GRETL - Gnu Regression Econometrics and Time Series Library

IMF – International Monetary Fund

KES – Kenya Shilling

KEGN – Kengen Co. Ltd

KENO – KenolKobil Limited

KPLC – Kenya Power & Co. Limited

MAR – Mean Abnormal Returns

NASI – NSE All Share Index

NSE – Nairobi Securities Exchange

OPEC – Organization of Oil Exporting Countries

TOTL – Total Kenya Ltd

USD – United States Dollar

ABSTRACT

The returns of securities such as stocks trading in securities exchanges across the world respond differently to different events and information components reaching the market in which such securities are listed. Several researchers have over the past used different models and methodologies to determine the information content of events and activities in the market. Previous literature strongly supports movement of stock prices and by extension stock returns as a result of events such as dividends and earnings announcements. However, very few researchers have studied the effect of Energy Regulatory Commission (ERC)'s announcements of price capping decisions on the returns of the firms listed in the affected sector in Kenya i.e. the Petroleum and Energy Sector. This study therefore sought to determine the effect the ERC's announcements on maximum petroleum products prices have on the returns of stocks listed in the Petroleum and Energy Sector of the NSE across the one-year period between October 2017 and September 2018. The study used the Event Study Methodology to achieve this objective using an 11-day long event window covering the period between Day -5 and Day +5 with the event date as the midpoint and an estimation period of 360 days before the event window. The findings of the study showed statistically significant Cumulative Abnormal Returns and significant negative Cumulative Mean Abnormal Returns during the event window at 95% confidence level. This indicates that ERC's announcements had a significant negative impact on the returns of stocks listed in the NSE's Petroleum and Energy Sector across the one-year period between October 2017 and September 2018.

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Based on the efficient market hypothesis as postulated by Eugene Fama in Cochrane and Moskowitz (2017), information on companies listed in the stock/securities exchanges and information on the industries in which these companies operate is expected to be reflected on such companies' securities prices for markets to be referred to as efficient. However, research has over the years shown that securities markets are not always efficient indicating that not all information associated with a security is reflected in the security's price. Proponents of the behavioral finance theory as cited in Thaler (2016) have over the years challenged the investor rationality assumption that forms the basis of traditional theory of finance and the findings of such researchers have shown that investors are not always rational in the process of making investment decisions. Pronouncements made by different participants in a securities market or an industry such as listed companies, regulators, government institutions, tax authorities etc. are expected to have an impact on price movements of the respective securities listed in the respective exchanges under the assumptions made in the efficient market hypothesis (EMH).

Securities returns in stock exchanges respond differently to different events and information components reaching the market, this covers a wide range of information including micro and macro-economic policy adjustments, information contained in earnings and dividends, management decisions on operational policies, capital structure decisions, products structure and pricing decisions etc. As cited in Kipronoh (2014), all

these information data trigger securities' returns responses of different form and magnitude leading to different conclusions on the theory of market efficiency as stipulated in the EMH theory. The impact that different information sets released into the market have on securities returns have over the years received considerable attention with most researchers focusing on earnings-based information sets such as earnings announcements and dividends announcements. However, other information sets such as revenue-based information sets for instance petroleum pump prices as cited in Kimathi (2017) have been found to have an influence on firms earnings indicating that if earnings announcements have an impact on the returns of securities trading in the stock markets, then variables that impact such earnings such as petroleum pump prices ought to have an impact on the securities returns by virtue of having an impact on the underlying firms' earnings. Therefore as argued in Kipronoh (2014), capital markets respond accordingly to corporate announcements such as earnings announcements, as such information contained in announcements affecting revenues of the affected firms such as petroleum products pump price caps are expected to have an impact on the earnings of such firms and by extension have an impact on the securities returns of the firms listed in the securities exchange based on the EMH theory.

The adjustment of price caps for petroleum products is expected to have an impact on the revenues of the underlying firms, in addition these effects are expected to cascade down to the underlying firms' earnings and the earnings are expected to influence the stock returns of such firms (Ombungu 2011). This indicates that announcements made with respect to petroleum pump prices are expected to carry valuable information with regards to the returns of firms listed in the affected sectors of the NSE where in this case the main affected

sector is the 'petroleum and energy' sector. As cited in Ahmed, Hussein and Ying (2010), a firm's earnings level is of the most significantly important signaling tool that the firm's managers would use to convey information to the investing public. As such, it is vital to analyze announcements that have an impact on such earnings with an aim of testing the efficiency of the NSE in the semi strong form of market efficiency as stipulated in the EMH theory. This formed the basis of this study.

1.1.1. ERC's announcements' information content

As cited in Layton, Robinson and Tucker (2011), Prices of various commodities in the market are mainly determined by demand and supply forces. However, in the Kenyan context, petroleum products pump prices are subject to price ceilings determined by the Energy Regulatory Commission (ERC) formed via the energy Act of 2006 with a main mandate of regulating the energy sector of the Kenyan Economy (Energy Regulatory Commission 2018a). As such, the ERC is responsible for setting the maximum prices of petroleum products such as petrol, diesel and paraffin. This indicates that the companies operating in the petroleum industry of the Kenyan economy can only sell their petroleum products at prices not exceeding the maximum prices set by the Energy Regulatory Commission.

Via the ERC, the government of Kenya plays an oversight role over the prices of petroleum products charged in the market. As described in Ombungu (2011), price regulation refers to the government's control of products prices with an aim of ensuring stability and sustainability on prices of commodities that are part of the main drivers of the economy. The above-mentioned control can only be carried out by a government agency or regulatory authority via a legal statute and this is the structure within which ERC was formed. The

economic law of demand and supply dictates that in a free market, price determination should be based on demand and supply forces and not the interference of regulators or governments (Welch and Welch 2016). Therefore, based on the law of demand and supply, the allocation of goods and services is expected to be based on value, However, competition within the market ensures that consumers get the lowest prices possible for the products they need. In markets that are not competitive or where prices are not a true reflection of such products' total costs, governments may intervene to set price ceilings to improve economic efficiency and stability (Kimathi 2017).

As a rule of thumb, petroleum products prices should be based on demand and supply where an increase in demand would lead to an increase in prices and vice versa while a decrease in supply would lead to an increase in prices and vice versa. As opposed to the expected price response to demand and supply forces under the law of demand and supply, the petroleum products market has a complicated pricing structure that is influenced by numerous other factors in addition to demand and supply. Geopolitical concerns, environmental concerns, foreign currency exchange rates and rules and regulations affecting the Oil and Petroleum Exporting Countries (OPEC) significantly influence the pricing models of petroleum products thus leading to the need for regulation of petroleum products in many countries across the world (Porter 2011). As cited in Kimathi (2017), the global petroleum industry follows an oligopolistic structure with a few firms dominating the entire market. This kind of structure necessitates some regulation to ensure that consumers are protected against exploitation by these firms in the form of practices such as inventory hoarding to manipulate prices etc. The dependence of most sectors on the petroleum and energy sector for their production and distribution of goods and services

also necessitates regulation because the sector is basically a significant driver of the global economy. Finally, an unregulated petroleum and energy sector can lead to significant fluctuations of petroleum products prices leading to economic instability and significant price disparity among different countries (Porter 2011).

On a global scale, international oil prices are controlled by OPEC which controls these oil prices via the pricing-over-volume strategy referred to as the 'accommodate strategy' that maximizes profits by using high oil prices thus allowing high cost non-OPEC oil producers to remain profitable and the volume-over-price strategy referred to as 'squeeze strategy' which drives up oil production thus driving prices down leading to an exit of high-cost non-OPEC oil producers from the market. OPEC uses the two strategies interchangeably depending on the prevailing demand and supply forces to set maximum oil products prices (Behar and Ritz 2016). Various opponents of price regulation such as Rockoff (2008) and Martin (2002) indicate that eventually such price regulations do not achieve their intended objectives leading to artificially low or high prices and they thus end up creating significant price fluctuations that destabilize the global economy. They therefore argue that global oil prices should be left to forces of demand and supply. This is a significant argument for purposes of this study as it helps create an understanding on whether regulation impacts products prices thus impacting firm earnings which drive stock returns.

On the regional scene as cited in Kimathi (2017), in Tanzania, Rwanda and Ghana petroleum products prices are regulated via the Energy and Water Utility Regulatory Authority, Rwanda Utilities Regulatory Authority and National Petroleum Authority respectively. However, in South Africa, the South African government regulates the prices of petrol but does not have control over the diesel prices. In Kenya as observed in Wanjiku

(2011), the petroleum industry operated under the free market structure where prices are determined by demand and supply forces up to December 2010 when the Energy Regulatory Commission was formed to regulate the petroleum products prices with an aim of curbing the effect of monopolistic tendencies practiced by the few firms that controlled the market thus leading to market distortions that heightened petroleum products prices. As a result of these controls, it is vital to understand how the performance of the firms which by extension affects the performance of their securities prices in the NSE is affected by the price controls.

The introduction of price controls in the petroleum industry ensures that petroleum products retail at similar prices across petrol stations regardless of the oil marketing company involved. To ensure that petroleum products retail at similar prices, the ERC uses data collected from the international oil prices, foreign currency exchange data and the prevailing demand and supply data to set maximum pump prices for petrol, diesel and kerosene all of which are petroleum products. The prices are announced on a monthly basis every 14th day of the month to cover the period between 15th day of the current month to 14th day of the following month. These announcements formed the basis of this study where the aim was to determine if there is information content in the announcements that influence the stock prices of firms listed in the NSE's petroleum and energy sector and thus influencing their stock returns.

1.1.2. Determinants of stock prices

The price of a stock or any other financial securities refers to the price at which that security is trading at the securities market. This is the price at which one can acquire one unit of ownership otherwise referred to as a share or a stock in the firm (Ombungu 2011). As cited

in Islam and Dooty (2015), stock markets have an important role to play in economic development of any economy across the world as they form a link between borrowers and lenders thus providing capital to run businesses. Their research which targeted 29 listed banks in Chittagong Stock Exchange in Bangladesh between 2010 and 2011 showed a strong correlation between dividends and retained earnings and stock market prices of the firms included in the sample. This indicates that dividends and firms' earnings are strong influencers of stock prices (Islam and Dooty 2015).

In his empirical study on the stock market price determinants in the Jordanian Commercial Banks, Shubiri (2010) found that stock market prices movements are a consequence of changes in micro and macroeconomic factors in the Jordanian economy. His findings also showed a strong significant correlation between stock market prices and net asset value, dividend per share and gross domestic product while on the other hand the study showed a negative significant relationship between stock market prices and inflation rate and average lending rates. This indicates that the main stock price determinants in the Amman Stock Exchange in Jordan is net asset value and the dividend yield of such firms while externally the firms' stock prices are determined by the country's GDP, rate of inflation and average lending rates (Shubiri 2010).

In their study on the determinants of stock prices in the NSE 100 companies in India Malhotra and Tandon (2013) found a strong support of firm specific factors such as dividends, book value and earnings as the main determinants of stock prices in the NSE 100 companies. In addition, their findings showed a strong correlation between earnings per share and stock prices and a strong correlation between stock prices and price earnings ratio.

In the Kenyan context, Waweru (2012) studied the determinants of stock price volatility in the NSE and her findings showed a strong correlation between stock prices and inflation rate as well as a strong correlation between stock prices and currency exchange rates. Gatua (2013) studied share price determinants in the NSE and her findings attributed changes in stock market prices to changes in macroeconomic variables such as GDP, Balance of trade and currency exchange fluctuations. In her sample of seven firms selected from various industries, her findings indicate a statistically insignificant impact of the above-mentioned macroeconomic factors on share prices.

According to Kipronoh (2014) and Muga (2014), in addition to macro and micro economic factors it is evident that both dividends and a firm's earnings influence the firm's stock prices. However, Kipronoh (2014) argues that firm's earnings have a higher influence its stock prices compared to dividends.

The above indicates that firms' earnings are a major determinant of their stock prices since they are indicators of such firms' performance. This remains the case across different industries across the stock market and as such earnings levels in the petroleum and energy industry are expected to have an impact on the stock prices of firms trading in that sector. This also indicates that factors that affect firms' earnings such as petroleum products pump prices are also expected to be part of the determinants of the stock prices of firms in this sector.

1.1.3. ERC's announcements and stock prices in the NSE

As a major contributor to economic growth, the petroleum and energy sector has a cascading effect on other sectors of the economy such as agriculture, manufacturing,

transport, communications etc. due to their dependence on electrical or fossil fuels-based energy to fuel production and distribution of their products. As such, this is a vital sector for economic growth an aspect that indicates that an impact on the petroleum pump prices as announced by the ERC is expected to have an impact on earnings of the firms operating in the petroleum and energy sector and such impact is expected to extend to the firms' stock prices since stock prices generally rise with positive earnings announcements and fall with negative earnings announcements as observed in Mureithi (2013).

As cited in Mureithi (2013), the selling prices of petroleum products such as petrol, diesel and paraffin are a significant factor in the profitability of companies operating in the energy sector of the Kenyan economy. It is also a significant factor in economic growth thus leading to government's intervention in regulating the prices of such products as a tool to make economic growth more stable and sustainable. According to Mureithi (2013), petroleum accounts for more than 80% of the country's energy needs. In addition, Kenya is a net importer of petroleum products an aspect that indicates that any slight change in international oil prices would lead to significant fluctuation in petroleum products' pump prices. This informed the decision to mandate the Energy Regulatory Commission with the responsibility of regulating the petroleum prices and such regulation ought to have an impact on the prices of securities trading in the Nairobi Securities Exchange's energy and petroleum industry as well as other industries that are highly dependent on the energy and petroleum industry.

As a trading bourse incorporated in 1954, The Nairobi Securities Exchange (NSE) is the largest securities exchange in East and Central Africa trading in both equity and fixed income securities. The NSE acts as a platform that facilitates the meeting of holders of

surplus funds (Lenders) and those in need of funds for investment purposes (Borrowers). According to NSE (2018a), as at 30th September 2018 there was an aggregate of 66 listed firms classified into 11 sectors. 5 of these are listed in the Energy and Petroleum sector (NSE 2018a). The NSE has an important role to play in the Kenyan economy by acting as an intermediary for funds transfer between investors and lenders where the lenders are deficit spending units of the economy otherwise referred to as net savers while the investors are surplus spending units of the economy otherwise referred to as net borrowers (Muga 2014).

As cited in Gachuhi and Iraya (2017), based on the efficient market hypothesis, investors would expect no reaction on securities prices after events such as bonus issues, earnings announcements etc. indicating that all the information contained in such events is already reflected in the indicated securities prices. As such, investors would not expect to earn any excess returns over and above the market average returns by using such information. This indicates that for the NSE to be an efficient market, the securities prices in the petroleum and energy sector and by extension the entire NSE, must reflect all the information about the maximum petroleum products prices announced by the ERC on the day such announcements are made. This based on the premise demonstrated in Gachuhi and Iraya (2017) indicates that the prices of securities in the petroleum and energy sector and by extension the NSE are expected to quickly adjust to the information that is contained in the price levels announcements made by the ERC without showing any significant drifts in securities prices during the period before and after the date of the maximum prices announcements.

This study therefore sought to find the effects that the price ceiling for petroleum products set by the ERC have on the prices of securities trading in the Petroleum and energy sector of the NSE and by extension the Kenyan Stock market due to the dependence of other sectors on the petroleum and energy sector for the production and distribution of their products.

1.1.4. The Efficient Market Hypothesis

Seeking to determine the impact that information reaching the public have on stock returns of firms trading in securities exchanges either approves or disapproves the efficient market hypothesis. As cited in Kipronoh (2014), previous researchers have carried out studies in various markets seeking to test the efficient market hypothesis and most of their findings indicate that developed markets such as United States of America and United Kingdom depict efficiency in the semi strong form of the EMH. However, studies in developing economies show contrary findings where evidence support market inefficiency in the semi strong form of EMH. Julijana (2016) argued that the variation in speed of information dissemination and the ability of market participants to interpret and react to such information lead to delays in response to information or overreaction to such information in the emerging economies

A test on the market efficiency in Nigeria by Olowe (1999) showed that the Nigerian stock market conformed to the weak form of market efficiency under the EMH. This was attributed to poor flow of information and unreliable communication systems leading to difficulty in interpreting the information in time for responses to occur. A study on the Ghanaian stock market by Osei (2002) showed that Nigerian and Ghanaian stock markets are inefficient in the semi strong form. This inefficiency was attributed to low liquidity,

poorly informed market participants and weaker regulatory and institutional frameworks in comparison with developed economies where high levels of regulation and use of sophisticated technology help enhance information flow leading to enhanced ability of the market participants to react to information reaching the markets.

This study sought to determine if the NSE is efficient in the Semi strong form of market efficiency by testing the reaction of the stock returns of firms listed in the NSE's petroleum and energy sector to the ERC's announcements on the maximum pump prices of petroleum products an aspect that is expected to impact on the firms' earnings and by extension their stock returns.

1.2. Research problem

The importance of the petroleum and energy sector in the Kenyan economy cannot be overemphasized. Several other sectors such as agriculture, manufacturing, transport and communications depend on this sector for production and distribution of their products and services. This sector is regulated by the Kenyan government via the ERC and such regulation calls for further research to determine the responsiveness of the stock market returns on the announcements made by ERC with regards to petroleum products pump prices with an aim of determining if the efficiency of the NSE with regards to information content contained in the ERC's announcements. This study made use of daily stock prices to determine if investors can make significant abnormal returns during the ERC's announcement period. The study aims to determine if stock prices around the ERC's announcement period increase or decrease or remain unchanged and thus approve or disapprove NSE's semi strong form of market efficiency.

Previous researchers such as Julijana (2016) have shown that securities prices react positively to positive price shocks and negatively to negative price shocks. However, Julijana (2016) research found no evidence of any price sensitive information accompanying one day price shocks. As such, his research concluded that irrational behavior by uninformed investors in the stock markets drives the stock market returns in the short run. This behavior negates the premise developed by Fama (1965) which postulates that stock prices at any given time are a full reflection of all available information on the underlying firms. A study by Maina (2009) on the effects of earnings announcements on quoted companies on the Nairobi Securities Exchange revealed that investors accrue positive returns during positive earnings announcements and negative returns during negative earnings announcements. This agrees with the findings of Anilowski, Feng and Skinner (2007) and Aga and Kocaman (2008) who found a positive correlation between returns and earnings announcements. Kipronoh (2014) found positive announcements such as dividend increases are associated with positive securities price reactions while negative announcements such as dividend decreases are associated with negative securities price reactions.

Emerging economies have numerous factors that influence securities prices leading to significant fluctuations including but not limited to liquidity, slow information flow and low literacy levels among market participants. These tendencies point towards significant inefficiencies in these markets leading to arbitrage opportunities that enable investors to make abnormal returns by making use of information being disseminated into the market an aspect that is not consistent with the efficient market hypothesis (Kipronoh 2014). Studies by Dasilas, Lyroudi and Ginoglou (2008) and Mohamed (2010) found positive

correlation between securities prices and earnings announcements. Louhichi (2008) on his research on intraday trading analysis found that investors tend to react positively to good news and negatively to bad news. However, most of these researchers focused on post reporting period financial data such as earnings announcements or dividend announcements. Rarely has announcements on pre-reporting period financial data been analyzed in the past on the effect it has on securities prices and by extension stock returns. This indicates that variables such as commodity prices e.g. petroleum products prices before such commodities are sold to generate revenues thus contributing to earnings of the underlying company have not been actively studied in the past. This research therefore sought to bridge this gap by seeking to establish the effect that maximum petroleum products price announcements made by the ERC have on securities trading in the petroleum and energy sector of the NSE.

1.3. Objective of the Study

The objective of this study was to determine the impact that ERC's announcements have on stock market returns of firms listed in the NSE's Petroleum and energy sector.

1.4. The value of the study

The purpose of this study is to establish the effect that ERC's announcements setting the maximum petroleum products pump prices have on the prices of securities trading in the NSE's petroleum and energy sector. Determination of this effect is significant to investors, academicians, market players in the petroleum and energy sector, regulators and policy makers especially since majority of the other sectors in the economy are heavily dependent on the petroleum and energy sector for the production and distribution of their products and services.

Institutional and individual Investors are always on the lookout for opportunities to make additional returns over and above their diversification strategies with an aim of maximizing their wealth. The findings of this research would help investors in making decision with regards to timing their investments in line with information release dates targeting abnormal returns associated with such information releases. The findings would also be beneficial in making portfolio balancing decisions to ensure that they are on course to achieve their investment return and risk objectives. The findings of this study shall also help to understand if there exist any arbitrage opportunities in the NSE around the dates in which petroleum products prices are announced by the ERC thus leading to abnormal profits to investors making use of the information contained in the announcements. It shall also help to determine if the NSE is an efficient market in the semi strong form of market efficiency.

As a price regulated sector of the Kenyan economy, the ERC's monthly announcements are expected to have a significant impact on the revenues of firms listed in the NSE's Petroleum and Energy Sector. different players in this sector will find the findings of this research useful as it helps policy makers in that sector to make price capping decisions having in mind an understanding of how such decisions impact the petroleum and energy sector of the Kenyan stock market and by extension the other sectors of the NSE that are significantly dependent on the petroleum and energy sector. This shall help to create appropriate price regulation announcement policies within the ERC as well as other regulators charged with the responsibility of regulating various aspects of the energy and petroleum sector not only in Kenya but also the World at large.

The findings of this study shall be very useful to management teams of companies listed in the petroleum and energy sector of the NSE as it would help them understand the relationship between ERC's announcements and the stock market returns of their firms. This understanding will be useful in the process of making capital structure decisions with regards to timing of such decisions.

The study shall also make a significant contribution to the body of knowledge on effect of products' price regulation in the petroleum and energy sector and since the sector is depended upon by numerous other sectors of the economy, the study shall make a significant contribution to the body of knowledge on effect of price regulation in the Kenyan economy. Being a rarely studied topic and especially since it affects pre-revenue generation stage of companies operating in the petroleum and energy sector and affects the cost structure of companies operating in energy and petroleum dependent sectors of the economy, the study shall make significant contribution towards available literature in this field for future researchers.

The study shall focus on the announcements made within the one-year period between 1st October 2017 and 30th September 2018. This period forms the most recent one period in the subject matter and as such the findings of the study are expected to reflect the current development in the Petroleum and energy sector of the Kenyan Economy as well as the entire NSE with regards to petroleum products' price regulation and the impact it has on the Kenyan Economy.

The study shall be limited to the announcements made by the ERC and the findings are therefore not applicable to any other body not directly mandated to regulate the energy and

petroleum industry of the Kenyan economy. The research is also limited to firms that are listed in the NSE whose securities are trading in the same Securities Exchange. This indicates that to determine the overall impact the subject matter has on the Kenyan economy, the validity of the findings of this research shall be limited to the assumption that the NSE All Share Index is a representative sample of all firms within the Kenyan economy whether listed in a securities exchange or not.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

Various researchers have over the past sought to determine what impact different announcements made by firms listed in securities exchanges, regulatory authorities etc. have on the prices of the underlying securities in such securities exchanges. This section of the study provides a brief review of the theoretical and empirical literature on the effect of petroleum products maximum prices announcements made by the ERC have on the prices of the securities listed in the NSE's petroleum and energy sector.

2.2. Theoretical Review

The relationship between securities prices and events announced in the market is founded under various theories the most distinct of which is the efficient market hypothesis. Other theories that form the basis of this relationship include the signaling theory and the random walk theory.

2.2.1. Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) refers to an investment theory that was developed by Eugene Fama in 1970 that asserts that financial markets respond efficiently to all relevant information that reaches them (Fama and Miller 1972). As cited in Ang, Goetzmann and Schaefer (2011), The implication of the efficient market hypothesis is that securities prices are a true and complete reflection of all available information with regards to the underlying firm, the industries they operate in and the economy at large. As such, where this theory holds, no single investor can consistently make use of information being

disseminated into the market to achieve risk adjusted abnormal returns. In their study on the effects of general elections on stock market returns at the Nairobi Securities Exchange, Kabiru, Ochieng and Kinyua (2015) observed that markets that are efficient have a tendency of exhibiting a random sequence of price changes that increases with increased efficiency thus indicating that a market with the highest efficiency exhibits completely random price trends that are completely unpredictable. These findings indicated that an efficient market follows the random walk theory.

As cited in Muga (2014), securities markets can only be termed as efficient if securities prices are always reflective of all the underlying information with regards to the firms whose financial securities are traded in the respective securities exchange. The above-mentioned information is classified into three subtypes namely private information with regards to the underlying firm, publicly available information with regards to the underlying firm and historical information contained in the firm's historical prices (Ang, Goetzmann and Schaefer 2011). An earlier research by Grossman and Stiglitz (1980) indicated that securities prices can only fully reflect all the underlying information if such information is costless. Otherwise the cost of obtaining the information would significantly affect the expected return from the securities in question an aspect that would influence the investors decision to obtain or not to obtain the information. The effect of cost on information attainment led to the revision of the definition of efficiency as described in Fama (1972) to a new description outlined in Fama (1991) where markets are said to be efficient if securities prices reflect all information on such securities and the information can be obtained and the respective securities traded at zero cost. On the other hand, if information cannot be obtained and trading carried out at zero cost, then the markets can

only be efficient to the extent where the marginal benefits of acting on the information is lower or equal to the cost of obtaining such information (Muga 2014).

Research findings of Grossman and Stiglitz (1980) indicates that as opposed to the main notion that a perfectly efficient market is one where securities prices reflect all available information on the underlying securities, empirical research studies have in recent times shown that deviation from this norm to test market efficiency based on the speed in which securities prices respond to new information yields more reliable results. This is in line with the findings of Julijana (2016) which indicated that uninformed investors react to new information at different speeds compared to their informed counterparts. As such uninformed traders may receive new information on a security but delay their response to such information or overreact on the same. Julijana (2016) and Grossman and Stiglitz (1980) therefore invalidates the semi strong and the strong form of market efficiency with the former indicating that behavioral finance influences investors decisions thus leading to deviation from rationality, yet investor rationality is among the key assumptions under the traditional theory of finance on which the efficient market hypothesis is founded (Cochrane and Moskowitz (2017).

Brooks, Patel and Su (2003) studied the stock markets response to unanticipated events and their findings indicated that securities prices adjust to overnight unanticipated events immediately while the announcement of bad news exhibits a reversal pattern in securities prices.

The above findings indicate that securities prices adjust almost immediately to announcements that relate to earnings, dividends and stock splits. However, none of the

previous researchers reviewed in this section have focused on the study of securities prices response to regulators announcements on price caps in the energy and petroleum sector in relation to the efficient market hypothesis. Therefore, it is vital to determine how securities prices responds to price regulation announcements especially in the energy sector which affects numerous other sectors of any economy. This study therefore sought to fill this knowledge gap by seeking to establish the impact that ERC's announcements have on the stock returns of firms trading in the NSE's petroleum and energy sector.

2.2.2. Signaling Theory

Signaling theory states that communications done by corporate managers of listed firms as well as decisions communicated to the market by the same contain signals aimed at influencing investor decisions in the stock market (Elton et al. 2009).

According to Otieno and Ochieng (2015), in line with signaling theory, communications and corporate financial decisions made by firms listed in the NSE are signals sent by such firms' corporate management teams to participants in the NSE such as investors with an aim of minimizing information asymmetry therefore facilitating investment decision making processes. Elton et al. (2009) considers such signals as part of the piecemeal dissemination of information to various parties in the securities markets by corporate managers with an intention of influencing decisions made by users of such information. Examples presented in Quiry et al. (2011) on this mode of information dissemination include corporate managers making announcements about dividend pay-out increases as an indicator of strong future performance of the firm in question thus influencing investors to invest in the firm's securities under the assumption that rational investors would want to maximize returns by investing in firms with strong future growth prospects.

As shown above, the signaling theory is mainly based on the assumption that corporate communications which are mainly internal and specific to the firm in question are a mode of conveying information by corporate managers to the investing public about the future of the firm. However, regulators can use the basis of this theory to send signals into the market with regards to the future of a certain industry or sector (Connelly et al. 2011). It is evident from previous researchers that this context of signaling has rarely been studied before. Therefore, though not as the main basis, the signaling theory shall be relied upon to determine if the ERC's announcement qualify as signals to the market on the direction of the stock market returns in the post announcement period.

2.2.3. Random Walk Theory

Random walk theory postulates that securities price changes have the same statistical distributions and are completely independent of each other an aspect that indicates that past movement of securities prices cannot be used to forecast future securities prices and as such the prices are random and unpredictable (Malkiel, 2011). This theory is mainly used to test the weak form of market efficiency where markets are said to be efficient if their past prices contain no information whatsoever that can be used to forecast future prices.

According to Kabiru, Ochieng and Kinyua (2015), majority of research carried out before 1970 on the efficient market hypothesis revolved around the random walk theory and the martingale model and these were the two statistical models used to describe unforecastable securities price changes that formed the basis for the development of the Efficient Market Hypothesis.

2.3. Determinants of share prices in the petroleum and energy sector

Various factors are involved in the determination of stock prices, asserts Ozlen and Ergun (2012). However, stock prices in different sectors are influenced by different factors. In their study on the internal determinants of stock price movements on sector basis, Ozlen and Ergun (2012) found that stock prices of companies listed in the energy and metal sectors are highly influenced by own internal factors while such influence is diminished with the increase in government or industry regulation.

Degiannakis, Filis and Arora (2017) studied the impact of oil prices on stock markets via a review of existing literature and found that the causal relationship between oil prices and stock market returns depend on whether the data used was from aggregate stock market indices, sector indices or firm-level data, also the findings depended on whether the stock markets studied are within net oil importing or net oil exporting countries. However overall findings showed that oil price volatility lead to stock market volatility indicating that oil prices have a significant impact on stock market returns regardless of whether the market in question is in a net oil importing or a net oil exporting country (Degiannakis, Filis and Arora (2017).

Siddiqui (2014) studied the oil price fluctuation's effect on stock market performance in Pakistan and his findings indicated that currency exchange rates, political stability, inflation and foreign private portfolio investment have significant influence on the performance of stock market in Pakistan.

In the Kenyan context, Waweru (2012) studied the determinants of stock price volatility in the NSE and her findings showed a strong correlation between stock prices and inflation

rate as well as a strong correlation between stock prices and currency exchange rates. Gatua (2013) extended Waweru (2012)'s study by studying the overall share price determinants in the NSE and her findings attributed changes in stock market prices to changes in macroeconomic variables such as GDP, Balance of trade and currency exchange fluctuations. In her sample of seven firms selected from various industries, her findings indicate a statistically insignificant impact of the above-mentioned macroeconomic factors on share prices.

According to Kipronoh (2014) and Muga (2014) both of whom studied the stock price response to earnings announcements at the NSE, in addition to macro and micro economic factors influencing share prices in the NSE, it is evident that both dividends and a firm's earnings influence the firm's stock prices. However, Kipronoh (2014) argues that firm's earnings have a higher influence on its stock prices compared to dividends.

The findings of the above researchers indicate that on the international scene oil prices are a significant determinants of stock prices. However, in the local scenes most researchers have found firms' earnings and dividends as the significant factors in the determination of that firm's stock prices. As such, factors that impact on the firms' earnings such as the petroleum products pump prices ought to have an impact on the firm's stock prices and by extension its returns. This study therefore sought to expand this knowledge especially in the Kenyan context by studying petroleum products pump prices as a determinant of stock prices of firms in the petroleum and energy sector of the NSE.

2.4. Empirical literature review

2.4.1. International context

Various researchers have studied the effect of various information items on the movement of securities prices in various stock exchanges across the world.

Schrijver (2013), analyzed the stock market reactions to Food and Drug Administration (FDA) and European Medicine Agency (EMEA) announcements with a specific focus on Biotechnology and Pharmaceutical companies listed in the NASDAQ and the NYSE with an aim of determining how regulatory announcements affect the stock prices of listed companies. The study focused on announcements made between January 2008 and September 2012 and his findings show clear differences between stock price reactions to FDA and EMEA announcements and the responses were different between NASDAQ and NYSE listed firms. NASDAQ listed firms exhibited a significant positive reaction to positive announcements during the 60-day pre-announcement period leading to significant positive abnormal returns. Where the FDA announcements were negative, NASDAQ listed firms exhibited a significant decrease in stock prices during the pre-announcement period. On the day of the announcement, the stock price reactions among NASDAQ listed firms were instantaneous and statistically significant. The findings showed asymmetrical responses between positive and negative announcements where responses to negative announcements were more pronounced compared to positive announcements (Schrijver 2013). The findings indicate that NYSE listed firms showed no significant responses to either positive or negative announcements on the date of the announcement. However, the findings show positive reaction to FDA announcements during the pre-announcement period.

Chan (2001) studied the stock price reaction to public news about the underlying firms by comparing them with other firms that have similar returns but no identifiable publicly available news about them using the event study methodology. His findings showed evidence towards a post news drift an aspect that pointed towards an underreaction to information among investors in the stock markets. The findings showed Stronger drift where the bad news reach the market with a very strong reversal where significant price movements are not accompanied by public news.

Tella and Dyck (2008) extended Chan (2001)'s scrutiny of the securities prices reaction to public news by studying the stock market response to cost reduction and cost padding that are associated with Price-Cap regulations in the Chilean energy sector. Their findings indicate that since the regulators have a limited number of firms to draw information from before determining the price caps, private firms engage in inventory hoarding strategy in the period prior to the regulatory announcements thus creating demand and supply pulls that would influence the regulators decision. Their findings showed a strong response in stock market prices to regulatory review announcements leading to significant abnormal returns around the regulatory announcement dates which reverse during the post announcement period. Tella and Dyck (2008) findings concluded that the regulatory authority's price caps promoted large inefficiencies in the Chilean stock market leading to abnormal gains for investors who could interpret firms strategic positioning decisions during the pre-announcements period thus sending signals to the market days before the regulatory announcements are made.

Ekmekcioglu (2012) studied the effect of crude oil and how its price changes affect the global economy especially since it is the most demanded commodity in the transport and

logistics sector which is a sector used by almost 100% of the global trade sectors to move goods and services from one end of the world to the other. His findings show a strong correlation between crude oil prices and global economic growth indicating that there is a direct link between crude oil price levels and profitability of firms in the global economy. Similar findings were obtained by Shaari, Pei and Rahim (2013) who studied the effects of oil price shocks on different economic sectors in Malaysia. Their findings showed long term effects of oil price shocks on the agricultural, construction, manufacturing and transportation sectors of the Malaysian economy. The results of their grange causality tests showed strong effect of oil price shocks on the agricultural sector while the growth of the construction and transportation sectors was found to be heavily dependent on oil prices indicating that a slight change in oil prices leads to significant change in profitability of the construction and transportation sectors. The findings of Shaari, Pei and Rahim (2013) recommended introduction of price controls in Malaysia to protect the Agricultural, manufacturing, construction and transportation sectors.

2.4.2. The Kenyan context

Gatuhi (2013) studied the relationship between oil prices and stock market performance over a four-year period between January 2009 and Dec 2012. His findings showed a positive correlation between petroleum product prices and stock market returns indicating a positive relationship between stocks and petroleum products prices. The relationship between stock market performance and interest rates was however found to be negative. The findings showed no significant relationship between petroleum products consumption and stock market performance indicating that the volume of petroleum products consumed in the Kenyan economy has no influence on securities prices movement in the Nairobi

Securities Exchange. However, the prices do have a significant relationship with stock market prices (Gatuhi 2013).

Omagwa, Kihooto and Reardon (2017) sought to establish the effect of international crude oil prices and the USD – KES exchange rate on the average monthly retail prices of petroleum products during the period between 2009 and 2012 by comparing the period before price controls by the ERC i.e. year 2009 – 2010 and the post-price control period i.e. year 2011 – 2012. The findings showed a significant impact of monthly international crude oil prices and monthly exchange rates on average retail prices of the petroleum products in Kenya for the period before price controls. However, the findings showed varying effect on various petroleum products during the period after the price controls were introduced.

Ombungu (2011) studied the implication of price regulation by the ERC on the oil marketing strategies in Kenya and her findings indicates that the regulations had a significant impact on pricing strategies of companies operating in the oil marketing business but had little effect on their marketing strategies. These findings showed no difference between pre-price regulation period marketing strategies effectiveness and the post-price regulation period marketing strategies effectiveness. In addition, the research showed a decrease in competition after the price regulations were introduced while the price of petroleum products marginally decreased during the post-price regulation period compared to the pre-price regulation period.

Wanjogu (2013) sought to determine the impact that the government driven regulation of pump prices for petroleum products has on profitability of companies involved in the oil

marketing business by using causal research design and gross margin based on prices set by the ERC as the control variable while focusing on the period between 2007 and 2010. The study used the profitability ratios of oil marketing companies before and after the introduction of the price regulation. The findings of this research partly agreed with the findings of Chan (2008) where regulation of pump prices showed a negative impact on the profitability of oil marketing companies. Ahmed (2017) build on Chan (2008) findings to determine the effect of regulation of petroleum products pump prices on financial performance of companies involved in oil marketing business using a descriptive and inferential statistical research design and focusing on the period between 2012 and 2016. The findings of this research had stronger correlations between firms' financial performance and pump prices regulation than the earlier research by Wanjogu (2013). This indicates that regulation of pump prices had a significant impact on financial performance of oil marketing companies in Kenya. Similar findings were obtained by Kimathi (2017) who sought to determine the effect of price regulation on firm performance via a case study on Total Kenya Limited. The research found that petroleum products price regulation had a negative impact on the return on equity of petroleum firms in Kenya. However, Kimathi (2017) found a positive correlation between introduction of price regulations and revenues of firms in the petroleum industry.

Kojima (2013), studied the petroleum product pricing and complimentary policies across 65 developing countries within the period between 2009 and 2012. His findings indicate that price control decisions by governments across the 65 countries led to significant losses among the companies involved in the supply of oil products and acute oil products

shortages occasioned by the inefficiencies within refineries and protests among oil marketing companies.

2.4.3. Research gaps

As shown in the review of available literature, there are numerous studies that have been carried out in the past to determine the effect of different factors and events on the securities prices in stock exchanges across the world. In the international scene, Schrijver (2013), studied the effect of FDA announcements on stock prices of firms listed in the NASDAQ and the NYSE, Chan (2001) studied the effect of news on securities prices of firms listed in the Dow Jones, Tella and Dyck (2008) studied the effect of price caps on securities prices in the Chilean stock market and Kojima (2013) combined 65 countries to study the effect of price controls on companies' profitability. Locally, Wanjogu (2013), Ombungu (2011), Omagwa, Kihooto and Reardon (2017), Kimathi (2017) and Gatuhi (2013) studied various aspects of oil prices and their effects on profitability of companies, marketing strategies and market performance.

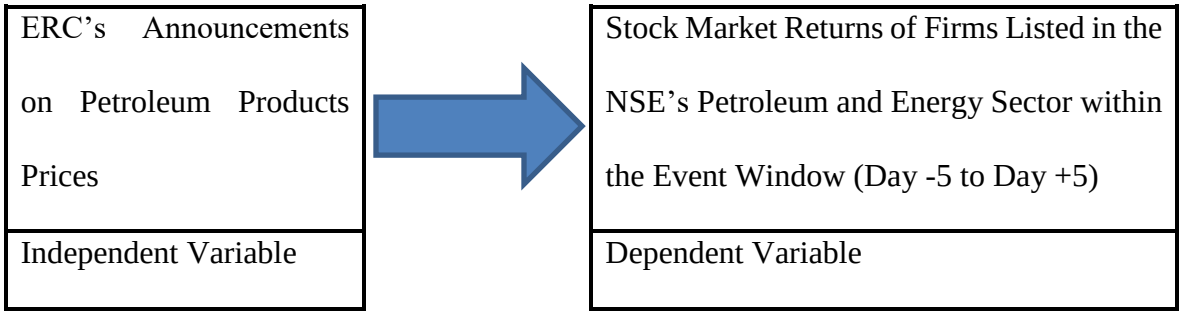
However, none of the above researchers focused on the price regulations in the Kenyan Petroleum products market and the impact it has on securities trading in the NSE's Petroleum and Energy Sector. In addition, the contextual and conceptual differences in the structure of researches carried out in the international scene such as in Schrijver (2013), and Tella and Dyck (2008) makes it difficult to directly replicate in the local context thus necessitating this research study as a way of building knowledge and understanding on the effect of petroleum products' price regulations on securities prices in the NSE's Petroleum and Energy Sector.

In addition, to the above gaps in previous research, the period used in this study which is between year 1st October 2017 and 30th September 2018 forms the most recent yet most significant time to conduct the study because surprise component that accompanied the price regulations when they were introduced in year 2010 had worn out by year 2017 and the companies operating in the petroleum and energy sector have already adjusted their strategic plans to accommodate the regulations thus minimizing the effect of other factors around the price regulation announcement dates on the securities prices. This indicates that the effect of noise on the data to be used in this research is minimal.

2.5. Conceptual framework

The study shall be based on the conceptual framework presented in figure 2.1 below.

Figure 2.1: Conceptual Framework



The study shall be based on the above conceptual framework where the ERC prepares the maximum petroleum products prices in readiness for announcement on the specific dates. Based on the economic conditions and the level of international oil prices, different players in the energy market express their opinions on the direction the prices may take in comparison with the previous month's prices. As the announcement date edges closer, the level of international oil prices and the prevailing economic conditions leads to a more

defined market perception. This leads to securities prices response to the expected announcements during the pre-announcement period (Gatuhi 2013).

Once the announcement is made, the market perception on the performance of companies in the NSE's Petroleum and Energy Sector may increase or decrease depending on the nature of the announcement. This is the announcement date response to the petroleum products prices information otherwise referred to as the event date response. After the announcement the securities prices may continue responding to the information during the post announcement period. Presence of any significant response in securities prices during the pre-announcement period, the announcement or the post-announcement period would indicate absence of the semi strong form of market efficiency (Muga 2014).

CHAPTER THREE

RESEARCH METHODOLOGY

1.1. Introduction

This chapter offers a detailed description of the methodology used in carrying out the study as guided by the specific objectives outlined in chapter one of this paper. The research design establishes the relationship that exists between the stock returns and announcements of petroleum products prices by the ERC. The chapter also describes the study location and the instruments used for data collection and analysis (Paterson et al. 2016).

1.2. Research designs

The research shall adopt an event study methodology which as described by Creswell (2014) refers to a research design that seeks to assess the impact of an event to the value of a firm by seeking to determine the relationship that exist between the event as the independent variable and the variable representing the value of the firm such as the stock market returns as the dependent variable. This according to Creswell (2014) is a scientific method which involves use of observation on the behavior of one variable when an event occurs with respect to another variable or variables.

This research design is preferable due to its ease because the researchers would use returns data that is already realized within the selected research period and compare it with expected returns modelled using the market model that is based on the capital asset pricing model (CAPM). This research sought to determine the relationship between announcements made on the Petroleum Product Prices and the prices of securities trading in the petroleum and energy sector of the NSE as well as the relationship between such

prices and the securities prices of firms listed in the NSE. The identified event for purposes of the research is the announcement of petroleum product prices which indicates that the event date is the date in which the petroleum prices are announced by the ERC.

To examine the effect of the announcement of petroleum products prices on stock returns in the NSE, the changes in stock prices was tracked around the dates within which the announcements were made each examination used a sample of four companies whose prices were examined based on the event study methodology where an event is defined, an event window developed around the event with an aim of examining the changes in stock prices occasioned by the event in question, an estimation period is developed for use in calculating the parameters used in the calculation of the expected returns that are used to calculate the abnormal returns within the event window. To achieve the objective of this paper, the event study methodology outlined above is based on the three steps outlined below.

1.2.1. Definition of the event

To develop a reference point for use in analyzing the behavior of stock market prices of firms included in the sample, an event was defined for each of the 12 announcements made within the one-year period between 1st October 2017 and 30th September 2018.

Since the ERC announces petroleum products prices every month, the sample period selected had a total of 12 announcements spread uniformly across the one-year period between 1st October 2017 and 30th September 2018. This forms a total of 12 events. The date in which each event was announced is the event date otherwise denoted as day zero and it forms the midpoint of the event window.

1.2.2. Selection of the event window

As a way of ensuring that the stock prices response to the event described above is sufficiently captured and to overlap between events, an event window of 11 days was used which is comprised of 5 days before the event announcement date denoted as days -5, -4, -3, -2, and -1., the event announcement date denoted as day 0 and the 5 days after the event announcement date denoted as days +1, +2, +3, +4, and +5. Therefore, the event window used is the period between day -5 and day +5 (Kliger and Gurevich 2014). The length of the event window was informed by the fact that the window needed to be long enough to capture the characteristic relatively slow information flow in developing markets in Kenya falls compared to their developed counterparts as cited in Kipronoh (2014). On the other hand, the event window needed to be short enough to avoid pre-event or post-event reaction overlap between subsequent months' announcements. The post event returns of the petroleum products prices are used to test for market efficiency.

1.2.3. Selection of the estimation window

To ensure that the measurement of the effect of the event on the stock prices is captured during the event window, the expected returns of the stocks of the firms included in the sample were calculated for use together with their actual returns to calculate the abnormal returns of each of the stocks (Paterson et al. 2016). The data used in the calculation of the expected returns is the stock price data and the index data during the estimation period which has been selected to be the 360 days before the event window otherwise denoted as the period between day -5 and day -365. The selection of this period was informed by the need to take care of the cyclical effect of stock price movement therefore a period of one financial year was ideal. The estimation window was used to calculate the risk of the stock

in relation to the market otherwise denoted as (Beta) and the return of the stock that is generated after all transaction costs otherwise denoted as alpha (Ekcbo 2011).

1.2.4. The target population

The research targeted a population of 4 stocks listed in the NSE's petroleum and energy sector as at 30th September 2018 and the NSE All Share Index as at 30th September 2018 which was used to calculate the components of the capital assets pricing model (CAPM) with an aim of determining the expected returns for the four stocks mentioned above. The four targeted stocks were used to determine the effect that ERC's announcement of petroleum products prices have on securities prices of firms listed in the NSE's petroleum and energy sector.

1.2.5. Sample data

The study made use of the daily stock price data for four stocks listed in the NSE's petroleum and energy sector and the daily NSE All Share Index data as a representative of the market returns in the Capital Assets Pricing Model. The study made use of the announcements made by the ERC as listed in the ERC websites press releases data base for the period between 1st October 2017 and 30th September 2018 (Energy Regulation Commission 2018b). The sample was selected based on a simple criterion where the main requirement for inclusion of the firms in the sample was being listed in the Nairobi Securities Exchange and has been actively trading across the one-year period between 1st October 2017 and 30th September 2018. This indicates that securities that had not been actively trading across the one-year period such as Umeme Ltd which was thinly traded as a newly listed stock in this period were excluded from the sample. The firms included in the sample are as outlined in table 3.1. below.

Table 3.1. Firms listed in the energy & petroleum sector of the NSE

ENERGY & PETROLEUM SECTOR of NSE			
Securities	**ISIN Code**	**Trading Symbol**	**Total Number of Issued Shares**
KenGen Co. Ltd	KE0000000547	KEGN	6,243,873,779
KenolKobil Ltd	KE0000000323	KENO	1,471,761,200
Kenya Power & Lighting Co Ltd	KE0000000349	KPLC	1,951,467,045
Total Kenya Ltd	KE0000000463	TOTL	175,028,706

Source: NSE (2018b)

As shown in table 3.1. above, the four firms used in this study include Kengen Co. Ltd, KenolKobil Ltd, Kenya Power & Lighting Co. Ltd and Total Kenya Ltd. Two of these firms (i.e. KenolKobil Ltd and Total Kenya Ltd) are directly affected by ERC's petroleum prices since they are oil marketers while the other two (i.e. Kengen Co. Ltd and Kenya Power & Lighting Co. Ltd) are power producing and distribution companies who are heavy users of petroleum products (NSE 2018).

1.2.6. Data collection

The study made use of secondary data comprised of securities prices obtained from the Nairobi Securities Exchange (NSE 2018) and petroleum products price announcements obtained from the press release section of the Energy Regulatory Commission's website (Energy Regulatory Commission 2018b). The data collection procedure mentioned above was selected due to its ease of access and use since the NSE publishes daily securities prices and maintains a database of historical securities prices of all firms listed in the exchange and all its indices. On the other hand, the ERC publishes the petroleum products prices every month and maintains a database of all the announcements made with regards to petroleum products prices in its press release section (Energy Regulatory Commission

2018b). The data was then recorded in excel spreadsheets ready for manipulation using the data manipulation tools outlined in the data processing and analysis section below.

1.3. Data processing and analysis

1.3.1. Analysis tools

The data collected above was processed and analyzed using MS Excel 2016 to determine the individual securities' returns, the expected market returns and the abnormal returns. On the other hand, the Gnu Regression Econometrics and Time Series Library (GRETL) software was used to test for normality of daily securities returns and the market returns, the equality of variances of the compared samples and the heteroskedasticity in the error term in the market model to ensure that the results of the standard t-test which was used to test for the statistical significance of the average returns (AR) and the cumulative average returns (CAAR) for the four stocks are valid (Wooldridge 2015).

1.3.2. Calculation of actual returns

The effect of the ERC's announcements on the securities prices of the four stocks in the sample was analyzed using the analytical model where the actual daily returns for the individual stocks and the NASI during the event window and the estimation period were calculated as shown below.

The actual returns are denoted as Ri and they are calculated using equation 1 below

$$Ri = \frac{P_t}{P_{t-1}} + D_t - 1 \quad \text{..... Equation 1}$$

Where;

Ri refers to the one-day return on security i

P_t - refers to the daily price of security i on day t

P_{t-1} - refers to the daily price of security i on the day before day t

D_t - refers to any dividends that may have been received on day t

Note that to eliminate the effect of the dividends in equation 1, dividend adjusted prices were used to calculate the actual daily returns of the securities thus adjusting equation 1 to equation 2 shown below.

$Ri = \frac{P_t}{P_{t-1}} - 1$…… **Equation 2**

Where

P_t - refers to the dividend adjusted daily price of security i on day t while

P_{t-1} - refers to the dividend adjusted daily price of security i on the day before day t (Kliger and Gurevich 2014).

1.3.3. Calculation of expected returns

The expected daily returns for the four stocks during the event window were calculated using the capital asset pricing model where the parameters of the CAPM were calculated by running a simple regression of the actual returns of the individual stocks on the actual returns of the market as represented by the NASI index during the estimation period. The CAPM is as represented in equation 3 below (Kliger and Gurevich 2014).

$ERi = \alpha + \beta * RM + \varepsilon_i$…… **Equation 3**

Where;

ERi – refers to the expected daily returns on security i on day t

α – refers to alpha coefficient associated with security i on day t. This is the return of security i on day t that is not dependent on the market return as represented by the return of the index.

β – refers to the beta coefficient of security i which refers to the risk associated with security i's daily returns in relation to the market's daily returns otherwise refers to as systematic risk.

RM – refers to the actual average daily return of the market as represented by the actual average daily return of the representative stock market index during the estimation period

ε_i – refers to the regression error term associated with security i's daily returns. This represents the risk that can be avoided by the investor i.e. the risk that is not directly associated with the relationship between security i and the market.

Note that it was assumed that investors use efficient diversification strategy and as such the investment would only compensate investors for the systematic risk (Kliger and Gurevich 2014). Therefore, the error term in equation 3 above is assumed to be equal to zero. As such, equation 3 transformed to equation 4 below.

$ERi = \alpha + \beta * RM$…….…….…. **Equation 4**

The expected returns the alpha and beta coefficients shown in equation 4 are calculated using single factor ordinary least squares regression of daily securities returns and the market return during the estimation period which is the 360 days period before the event window i.e. day -365 to day -5. The length of the estimation period was informed by the need to allow securities to stabilize after previous announcements assuming that such

announcements have no cascading effect on future announcements and to allow for the cyclical effect of the NSE trading processes thus making a one-year estimation period ideal for this analysis.

1.3.4. Calculation of abnormal returns (AR)

The effect that the event mentioned above would have on the share prices of the firms included in the sample was examined by comparing the actual returns with the expected returns of the firms' stocks during the event window. Any difference between the two is referred to as the Abnormal returns. This indicates that if the event had no effect on the stock returns of the firms included in the sample, then the actual returns would be equal to the expected returns thus indicating that the abnormal returns would be equal to zero. Therefore, presence of abnormal returns is an indicator of an effect of the event on the firms' stock returns. The abnormal returns are calculated using equation 5 below.

$ARi = Ri - ERi$……**Equation 5**

Where;

ARi – refers to the Abnormal daily returns on security i on each day within the event window

Ri – refers to the actual daily return on security i on each day within the event window

ERi – refers to the expected return on security i on each day within the event window.

1.3.5. Calculation of the cumulative abnormal returns (CAR)

The cumulative abnormal returns during the event window was used in the analysis to determine if the abnormal returns during the event window are significant. The cumulative abnormal returns (CAR) were then tested for statistical significance at 95% level of confidence to determine if the abnormal returns during the event window are different from zero thus providing proof on whether they are statistically significant.

The basic description of the CARs is the summation of the abnormal returns for each firm in the sample during the event window as represented by equation 6.

$Cumulative\ abnormal\ returns(CAR) = \sum_{t=-5}^{t=+5} \text{Ar}$…… **Equation 6**

Where;

- Ar – represents the abnormal returns in each day within the event window i.e. the period between day -5 and day +5

1.3.6. Calculation of mean abnormal returns (MAR)

The mean abnormal returns during the event window was used in the analysis to determine the average daily abnormal returns of the four firms included in the sample and the equally weighted portfolio comprised of the stocks of the firms included in the sample to determine if the event had an impact on the firms included in the sample individually and collectively.

The basis description of MAR is the average of the abnormal returns of the four firms and the equally weighted portfolio across the twelve events in each day within the event window as represented in equation 7 below.

$MARi = \frac{\sum ARt}{N}$ …… **Equation 7.**

Where;

$MARi$ – refers to the mean abnormal return of the four firms and the equally weighted portfolio comprised of securities included in the sample on each day within the event window.

$\sum ARt$ – refers to the sum of abnormal returns of the four firms and the equally weighted portfolio on each day within the event window.

N – refers to the number of events analyzed within the sample period.

1.3.7. Calculation of the cumulative mean abnormal returns (CMAR)

The cumulative mean abnormal returns during the event window was used in the analysis to determine if the mean abnormal returns during the event window are significant. The cumulative mean abnormal returns were then tested for statistical significance at 95% level of confidence to determine if the mean abnormal returns of the four firms and the equally weighted portfolio during the event window are different from zero thus providing proof on whether they are statistically significant.

The basic description of the CMARs is the summation of the abnormal returns for the four firms and the equally weighted portfolio comprised of the firms in the sample during the event window as represented by equation 8.

$Cumulative\ mean\ abnormal\ returns(CMAR) = \sum_{t=-5}^{t=+5} \text{MAR}$..... **Equation 8**

Where;

- MAR – represents the abnormal returns of the four firms and the equally weighted portfolio (EWP) in each day within the twelve event windows i.e. the period between day -5 and day +5 (Ekcbo 2011).

1.3.8. Test of statistical significance

To test if the ARs are statistically significant at 95% level of confidence, the t-test shown in equation 9 below was used.

$$t = \frac{AAR}{\frac{\sigma_{AAR}}{\sqrt{N}}} \text{.....} \textbf{Equation 9}$$

Where;

- σ_{AAR} represents the standard deviation of the abnormal returns during the event window (Wooldridge 2015).
- AAR represents the average abnormal returns across the 12 event windows on each specific day within the event window.
- N represents the number of events analyzed within the sample period

To test if the CMAR are statistically significant at 95% level of confidence, the t-test shown in equation 10 below was used.

$$t = \frac{CMAR}{\frac{\sigma_{CMAR\ t1,t2}}{\sqrt{N}}} \text{.....} \textbf{Equation 10}$$

Where;

- $\sigma_{CMAR\ t1,t2}$ represents the standard deviation of the mean abnormal returns between day t1 and day t2 within the event window (Wooldridge 2015).

- N represents the number of events analyzed within the sample period

1.3.9. Result interpretation

If the results of equation 9 show that the AR are not significantly different from zero, then the event in question has no impact on the stock price returns of the individual firms included in the sample. On the other hand, if equation 9 shows that the AR is significantly different from zero, then the event in question has a statistically significant impact on the stock returns of the firm in question at 95% level of confidence.

If the results of equation 10 show that the CMAR are not significantly different from zero, then the event in question has no impact on the stock returns of the individual firms included in the sample on a cumulative basis across the event window. On the other hand, if equation 10 shows that the CMAR are significantly different from zero, then the event in question has a statistically significant cumulative impact on the stock returns of the firms in the sample across the event window at 95% level of confidence.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1. Introduction

In this chapter, the data analysis and findings were presented within the framework sought to answer the research questions and achieve the objective of the study as outlined. The study sought to achieve an objective of determining the effect of announcement of petroleum products prices by the ERC on the stock returns of firms listed in the Petroleum and Energy sector of the NSE. Secondary data was collected from the NSE and the ERC and analyzed in relation to the objective of the study and the findings presented as below.

4.2. Data presentation

4.2.1. Average actual returns during the event window

The average actual returns for the four stocks included in the sample across the 12 events within the 11-day event window are as presented in table 4.1. below.

Table 4.1. Average actual returns during the event windows

Average Actual Returns During Event Window for the 12 Events						
Date	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**	**NASI**
+5	0.7%	0.2%	0.4%	-1.0%	0.1%	0.2%
+4	-0.5%	-0.2%	-0.1%	0.3%	-0.1%	-0.2%
+3	-0.4%	0.1%	-0.4%	-1.4%	-0.5%	-0.1%
+2	-0.1%	-0.4%	-0.9%	1.8%	0.1%	-0.1%
+1	0.1%	-0.1%	-0.4%	-0.6%	-0.2%	-0.1%
0	0.0%	0.4%	-0.3%	0.4%	0.1%	0.0%
-1	-0.7%	-0.2%	-0.2%	0.6%	-0.1%	-0.2%
-2	-0.6%	-0.5%	-0.1%	0.4%	-0.2%	-0.4%
-3	0.0%	-0.8%	-0.7%	0.1%	-0.4%	-0.1%
-4	-0.1%	0.8%	-0.5%	-0.4%	-0.1%	0.2%
-5	0.6%	0.9%	-0.7%	-0.1%	0.2%	-0.2%

Table 4.1. shows the average actual returns arrived at after recording the stock prices as obtained from NSE (2018b) and using the same to calculate the actual returns using equation 2 during each of the twelve event windows in the twelve events across the one-year period between 1st October 2017 and 30th September 2018. The figures indicate that two stocks i.e. Kengen Co. Limited and Total Kenya Ltd recorded a positive average actual return on the event date across the twelve events while Kenya Power and Lighting Co. Limited recorded a negative average actual return on the event date across the twelve events within the sample period. KenolKobil Ltd and the Nairobi Securities Exchange All Share Index (NASI) recorded zero average actual returns on the event date as shown in table 4.1 indicating that the stock and the index did not respond to the events across the sample period. An equally weighted portfolio comprised of the four stocks included in the sample recorded a positive average actual return of 0.1% on the event date indicate that collectively on average the stocks in the sample had a positive response to the events across the one-year long sample period.

4.2.2. Normality test on data used in the estimation period

For ease of reference and testing, the equally weighted portfolio for each of the twelve events was used to test the data for normality during the estimation period. The twelve datasets of stock returns during the estimation period were tested for normality using GRETL software to determine if they followed a normal distribution and the findings outlined in appendix 2 were obtained. The Doornik-Hansen test, the Shapiro-Wilk test, the Lilliefors test and the Jarque-Bera test for normality all showed normality test values that were higher than 0.05 indicating that at 95% level of confidence, the findings provided

evidence that all the twelve events had returns that followed a normal distribution during their estimation period.

4.2.3. Regression output of the single factor regression model

The single factor regression model was used to derive the parameters for use in calculating the expected returns using CAPM as outlined in equation 4 and the results of this single factor regression are as presented in table 4.2.

Table 4.2. Single factor regression output

		CAPM Model Parameters											
Stock	**Event**	**Sep-18**	**Aug-18**	**Jul-18**	**Jun-18**	**May-18**	**Apr-18**	**Mar-18**	**Feb-18**	**Jan-18**	**Dec-17**	**Nov-17**	**Oct-17**
Regression Output													
KENO	Alpha (α)	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	P-Value	0.35	0.44	0.25	0.54	0.31	0.27	0.30	0.41	0.29	0.28	0.25	0.21
	Beta (β)	0.647	0.231	0.245	0.290	0.279	0.318	0.274	0.233	0.255	0.257	0.287	0.309
	P-Value	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.00
	R-Square	0.078	0.017	0.018	0.022	0.018	0.023	0.019	0.016	0.019	0.020	0.022	0.024
KEGN	Alpha (α)	0.000	-0.000	0.001	-0.000	0.001	0.001	0.000	0.001	0.000	0.001	0.001	0.000
	P-Value	0.90	0.60	0.58	1.00	0.50	0.56	0.75	0.50	0.65	0.47	0.32	0.96
	Beta (β)	1.178	0.544	0.569	0.596	0.681	0.711	0.667	0.493	0.478	0.483	0.504	0.459
	P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	R-Square	0.178	0.060	0.062	0.071	0.093	0.093	0.082	0.053	0.051	0.053	0.054	0.041
KPLC	Alpha (α)	-0.000	-0.001	-0.000	-0.001	-0.001	-0.001	-0.000	-0.000	0.000	0.000	-0.000	-0.000
	P-Value	0.68	0.50	0.65	0.40	0.31	0.46	0.89	0.93	0.96	0.95	0.99	0.77
	Beta (β)	1.314	0.409	0.458	0.471	0.511	0.468	0.295	0.337	0.342	0.379	0.393	0.353
	P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	R-Square	0.206	0.035	0.048	0.046	0.052	0.040	0.018	0.024	0.024	0.030	0.030	0.024
TOTL	Alpha (α)	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.001	0.001	0.001	0.001	0.001
	P-Value	0.32	0.18	0.20	0.15	0.14	0.16	0.23	0.28	0.31	0.34	0.46	0.58
	Beta (β)	0.434	0.166	0.193	0.219	0.227	0.171	0.098	0.179	0.158	0.202	0.198	0.205
	P-Value	0.07	0.37	0.28	0.23	0.20	0.33	0.54	0.23	0.29	0.16	0.18	0.15
	R-Square	0.009	0.002	0.003	0.004	0.005	0.003	0.001	0.004	0.003	0.005	0.005	0.006
EWP	Alpha (α)	0.000	0.000	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
	P-Value	0.65	0.51	0.20	0.42	0.25	0.23	0.23	0.24	0.24	0.20	0.20	0.50
	Beta (β)	0.377	0.338	0.366	0.394	0.425	0.417	0.334	0.311	0.308	0.330	0.345	0.331
	P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	R-Square	0.078	0.062	0.072	0.081	0.091	0.085	0.063	0.060	0.059	0.070	0.072	0.065

The results in table 4.2. were obtained by running a single factor regression of the actual daily returns of each of the four stocks and the equally weighted portfolio on the market returns as represented by the actual daily returns of the NASI index during the estimation period.

As shown in table 4.2., the alpha values of the four stocks included in the data sample range from -0.001 to 0.002 indicating that during the estimation period, the returns of the stocks and the equally weighted portfolio that are not dependent on the market movements fall within the range of between -0.1% and 0.2%. As shown by the P-values, only KPLC recorded statistically significant alpha values during the estimation period in the three out of the twelve events analyzed. The statistically significant alpha values for KPLC at 95% level of confidence were recorded in the November 2017, December 2017 and January 2018 event estimation periods as shown in table 4.2. All the other alpha values across the twelve events show statistical insignificance at 95% level of confidence as they are all higher than 0.05. The p-values also indicate that the returns during the event estimation period across the twelve events analyzed followed a normal distribution since they are all higher than 0.05.

The beta values shown in table 4.2 indicate that all the systematic risk of the returns of the four stocks were statistically insignificant at 95% level of confidence as shown by their respective p-values. These beta values are increasing across the twelve events indicating that the systematic risk of such stocks and the equally weighted portfolio is increasing with the increase in petroleum product prices whose increasing trend is shown in appendix 1.

The R-Square values indicate that the NSE all share index (NASI) is a poor predictor of the returns of the four stocks included in the sample and the equally weighted portfolio as shown by the fact that all the R-Square values are less than 10% indicating that in most of the events, more than 90% of the changes in the stock returns could not be explained by the changes in the NASI index returns and thus they occurred by chance or were caused by other factors (Wooldridge 2015).

4.3. Results and Discussions

4.3.1. Abnormal returns within the event window

The abnormal returns as calculated using equation 5 during the 12 event windows are as presented in appendix 3. However, table 4.3. below show the abnormal returns on the event date in each of the 12 events.

1Table 4.3. Abnormal returns on the event date (Day 0)

Abnormal Returns on the Event Date					
Event	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
Sept 2018 Event	-1.3%	5.3%	-4.7%	-5.7%	-1.3%
Aug 2018 Event	0.1%	-1.8%	-0.2%	3.0%	0.3%
July 2018 Event	-0.1%	-0.1%	0.0%	-0.2%	-0.1%
June 2018 Event	1.6%	-0.7%	4.6%	-0.9%	1.2%
May 2018 Event	1.7%	1.1%	-1.7%	2.2%	0.8%
April 2018 Event	-0.1%	-0.1%	0.1%	-0.2%	-0.1%
Mar 2018 Event	-0.5%	-0.3%	-0.8%	4.2%	0.7%
Feb 2018 Event	-2.1%	-0.2%	-1.3%	-0.2%	-1.0%
Jan 2018 Event	-0.1%	0.0%	0.0%	-0.1%	-0.1%
Dec 2017 Event	0.1%	0.9%	0.3%	2.0%	0.8%
Nov 2017 Event	-0.4%	0.0%	-0.4%	-1.1%	-0.5%
Oct 2017 Event	-0.1%	0.0%	0.0%	-0.1%	0.0%

As shown in appendix 1, the prices of Super Petrol and Diesel decreased by 9% and 6% respectively while Kerosene increased by 11.3% in September 2018. This led to a decrease in abnormal returns in three out of the four stocks included in the sample as well as the equally weighted portfolio as shown in table 4.2. This indicates that the price decrease in super petrol and diesel led to a negative response for KENO, KPLC, TOTL and the EWP indicating that investors expected a decrease in earnings for the three companies occasioned by the decrease in prices indicating that investors expected the decrease in prices to negatively affect the four stocks. The decrease in petrol and diesel had a positive impact on KEGN indicating that investors expected the decrease to lead to cost savings for

KEGN since it is a heavy user of diesel fuel therefore leading to increased earnings. These increased earnings led to the positive abnormal returns recorded by KEGN on the event date in September 2018.

In August 2018, the prices of Petrol, Diesel and Kerosene increased by 14%, 11% and 13% respectively as shown in appendix 1 leading to a 0.1% increase in abnormal returns for KENO and 3% for TOTL indicating that the market expected the returns of the two oil marketers to increase with the increase in petroleum products prices. On the other hand, the abnormal returns of KEGN and KPLC both of which are heavy users of petroleum products decreased by 1.8% and 0.2% respectively indicating that the investors expected the increase in petroleum products to lead to decreased earnings for the two energy companies thus leading to decreased stock returns as shown in table 4.3.

In April 2018, the prices of Super, Diesel and Kerosene decreased by 0.6%, 0% and 0.9% respectively leading to a 0.1% decrease in KENO, KEGN, and EWP respectively and 0.2% decrease in abnormal returns for TOTL while abnormal returns for KPLC increased by 0.1% indicating that investors were expecting the decrease to lead to a decrease in earnings of the four firms except KPLC leading to a decrease in abnormal earnings as shown in table 4.3.

The abnormal returns outlined in table 4.3. and in appendix 3 showed that the stock returns for the four firms included in the sample responded accordingly to each of the announcements made in each of the event dates across the twelve events. On average, the response was negative indicating that the ERC's announcements led to a decrease in stock returns across the one-year period analyzed.

4.3.2. Cumulative abnormal returns within the event windows

The cumulative abnormal returns as calculated using equation 6 during the 12 event windows are as presented in appendix 4. However, table 4.4. below show the cumulative abnormal returns at the end of the event window in each of the 12 events.

Table 4.4; Cumulative abnormal returns (CAR) at the end of event window (Day +5)

Cumulative Abnormal Returns at end of event window					
Event	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
Sept 2018 Event	-1.3%	15.6%	1.2%	3.8%	-1.4%
Aug 2018 Event	-3.1%	6.9%	2.6%	-3.3%	0.8%
July 2018 Event	-1.5%	-1.8%	-7.5%	3.4%	-1.8%
June 2018 Event	-2.9%	1.9%	2.2%	-3.0%	-0.5%
May 2018 Event	3.8%	-5.0%	-2.9%	-12.2%	-4.1%
April 2018 Event	1.0%	1.1%	1.2%	-4.5%	-0.3%
Mar 2018 Event	4.4%	3.7%	-1.8%	7.5%	3.5%
Feb 2018 Event	6.8%	0.5%	-4.7%	9.3%	3.0%
Jan 2018 Event	-0.5%	-1.5%	-5.0%	-1.9%	-2.2%
Dec 2017 Event	-9.3%	-1.4%	-7.4%	-11.9%	-7.5%
Nov 2017 Event	-2.4%	-3.7%	-1.7%	6.0%	-0.4%
Oct 2017 Event	-9.7%	-3.7%	-2.2%	-7.8%	-5.8%

As shown in table 4.4 the October 2017 event led to a decrease in cumulative abnormal returns as a result of the increase in petroleum product prices as shown in appendix 2. This indicates that the increase in fuel prices had a negative impact on the stock returns of all firms included in the sample as well as the equally weighted portfolio. The December 2017 event which saw a 1.4% increase in petrol, 0% increase in diesel and 0.3% increase in kerosene represented the highest impact on stock returns of the four firms represented in the sample across the twelve events which recorded a 9.3%, 1.4%, 7.4%, 11.9% and 7.5% decrease in CAR for KENO, KEGN, KPLC TOTL and EWP respectively as shown in table 4.4. The change in petroleum products prices in the March 2018 event which saw 0.4% decrease in petrol, 0.9% increase in diesel and a 0.9% decrease in kerosene resulted into a 4.4% increase in CAR for KENO, 3.7% increase in CAR for KEGN, 7.5% increase in CAR

for TOTL and 3.5% increase in CAR for the EWP. This increase was attributed to the expected increase in revenues for the oil marketers (KENO and TOTL) occasioned by the increase in diesel and kerosene prices while the KPLC experienced a decrease in CAR attributed to heavy diesel usage.

In the May 2018 event, petrol, diesel and kerosene prices increased by 0.3%, 0.8% and 2% respectively leading to a 3.8% increase in CAR for KENO, 5%, 2.9%, 12.2% and 4.1% decrease for KEGN, KPLC, TOTL and EWP respectively. Apart from TOTL which recorded a decrease in CAR after an increase in petroleum products prices as opposed to the expected increase occasioned by the expected growth in revenues, KPLC and KEGN both of which are heavy users of petroleum products recorded a decrease in CAR an aspect that was attributed to the expected decrease in earnings occasioned by the increased costs associated with the increased fuel prices.

The CARs presented in table 4.4 and in detail in appendix 4 shows that the ERC's announcements had an impact on the stock returns of firms listed in the petroleum and energy sector of the NSE where events announcing an increase in fuel prices led to positive CARs for the oil marketers i.e. KENO and TOTL and a decrease in CAR for the heavy users of petroleum products i.e. KPLC and KEGN.

Nine out of the twelve events analyzed recorded a decrease in CAR for the equally weighted portfolio indicating that on average the events had a negative impact on the stock returns of firms listed in the NSE's petroleum and energy sector. The results in table 4.4. shows that the December 2017 event led to the largest negative impact of the ERC announcements on the stock returns of firms listed in the NSE while the September 2018

event which saw a significant decrease in fuel prices led to the largest positive impact on the stock returns of firms listed in the NSE's petroleum and energy sector.

This impact is emphasized in table 4.5. and 4.6 below which shows the mean abnormal returns (MAR) and the cumulative mean abnormal returns (CMARs) respectively during each day within the event window based on the ARs and MARs for each event.

Table 4.5; Mean abnormal returns (MARs)

Mean Abnormal Returns (MARs)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	0.6%	0.2%	0.5%	-1.2%	-0.1%
+4	-0.4%	0.2%	0.4%	0.3%	-0.1%
+3	-0.4%	0.2%	-0.2%	-1.5%	-0.5%
+2	-0.1%	-0.4%	-0.9%	1.7%	0.1%
+1	0.0%	0.0%	-0.3%	-0.7%	-0.3%
0	-0.1%	0.3%	-0.3%	0.2%	0.1%
-1	-0.6%	0.0%	0.0%	0.5%	-0.1%
-2	-0.5%	-0.3%	0.2%	0.3%	-0.1%
-3	0.0%	-0.8%	-0.6%	0.0%	-0.4%
-4	-0.2%	0.7%	-0.5%	-0.6%	-0.2%
-5	0.6%	1.0%	-0.5%	-0.2%	0.2%

Table 4.6; Cumulative mean abnormal returns (CMARs)

All Events (CMAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-1.2%	1.1%	-2.2%	-1.2%	-1.4%
+4	-1.8%	0.9%	-2.7%	0.0%	-1.3%
+3	-1.4%	0.7%	-3.0%	-0.4%	-1.2%
+2	-1.0%	0.5%	-2.9%	1.1%	-0.7%
+1	-0.9%	0.9%	-2.0%	-0.5%	-0.8%
0	-1.0%	0.9%	-1.7%	0.1%	-0.6%
-1	-0.9%	0.6%	-1.3%	-0.1%	-0.6%
-2	-0.2%	0.6%	-1.4%	-0.6%	-0.5%
-3	0.3%	0.9%	-1.6%	-0.9%	-0.4%
-4	0.3%	1.7%	-0.9%	-0.9%	0.0%
-5	0.6%	1.0%	-0.5%	-0.2%	0.2%

As shown in table 4.5 and 4.6 above, the MAR and the CMAR across the 12 event windows shows that on average the events led to a negative impact on the returns of stocks listed in the NSE's petroleum and energy sector as shown by the CMARs of the EWP, TOTL, KPLC and KENO. This indicates that KENO, KPLC and TOTL responded to the increases in fuel prices negatively a response that was replicated by the EWP as shown in table 4.5 and 4.6. On the other hand, the events which on average showed an increase in the price of petroleum products across the twelve months led to positive impact on the returns of KEGN indicating that KEGN responded positively to these increases even though they translated to an increase in its cost of fuel for running its operations. However, during the period under scrutiny, the country experienced significant rainfall indicating that KEGN which recorded a positive response to the events had low dependence on petroleum products to run its power generation operations by using alternative means such as running surface water to drive its turbines thus leading to a low impact of the events on its cost structure.

4.3.3. Significance test results during the event window

The test for statistical significance for the abnormal returns and cumulative abnormal returns was carried using the t-test as represented by equation 9 and 10 and the results for the same are as presented in table 4.7. below.

Table 4.7. T-test for statistical significance of MARs and CMARs

T-test @ 95% confidence level for MAR						T-test @ 95% confidence level for CMAR					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**	**Day**	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	0.79	0.54	1.93	1.69	0.23	+5	0.88	0.67	2.23	0.60	1.57
+4	2.08	0.26	0.96	0.52	0.51	+4	1.68	0.59	2.41	0.03	1.68
+3	0.82	1.09	0.44	3.25	2.17	+3	1.24	0.66	2.96	0.23	1.76
+2	0.43	0.88	2.53	1.64	0.19	+2	1.18	0.48	2.80	0.85	1.33
+1	0.11	0.05	0.93	1.10	1.08	+1	1.02	0.96	2.29	0.41	1.30
0	0.33	1.60	0.75	0.48	0.36	0	0.96	1.18	1.80	0.10	0.86
-1	1.62	0.11	0.12	0.82	0.51	-1	0.82	0.68	2.04	0.07	0.97
-2	1.40	1.06	0.46	0.39	0.49	-2	0.22	0.68	2.09	0.43	0.84
-3	0.03	1.82	1.85	0.09	2.30	-3	0.41	0.96	2.15	0.63	0.71
-4	0.76	1.27	1.06	1.17	0.60	-4	0.65	1.73	1.81	0.62	0.01
-5	2.93	1.17	1.64	0.20	0.55	-5	2.62	1.16	1.06	0.20	0.52

As shown in table 4.7. tests for statistical significance indicate that all the Average returns for the four firms included in the sample during each day in the event windows are all statistically significant at 95% level of confidence as indicated by the t-statistic values which are all greater than 0.05.

The mean average returns (MARs) are represented by the cumulative average/mean returns of the four firms and the equally weighted portfolio and the t-statistic for the four stocks and the EWP shows that the cumulative mean average returns are also statistically significant at both 95% level of confidence. This indicates that the impact that the events have on the stock returns of the four firms included in the sample and the entire petroleum and energy sector as represented by the equally weighted portfolio are statistically significant at 95% level of confidence. Only TOTL recorded a statistically insignificant CMAR on day +4 indicating that the cumulative impact of events had no impact on TOTL stock returns 4 days after the event. On the event date all firms and the equally weighted portfolio recorded statistically significant abnormal returns and cumulative abnormal returns indicating that the impact of the events started before the announcement was made.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter outlines the summary of the study, the conclusions and recommendations as derived from the study. The summary mainly captions the vital elements of the study such as the objectives and how such objectives have been addressed by the findings and results of the study. Major conclusions are then drawn from these findings and recommendations made for use in policy and strategic framework in the ERC's pump prices formulation and for use by future researchers to advance the body of knowledge in academia.

5.2. Summary

The study sought to determine the effect of ERC's announcements on the stock returns of firms listed in the NSE's petroleum and Energy sector using the event study methodology as described in Eckbo (2011) and Kliger and Gurevich (2014). These announcements are made every month on the 14th day of the month for prices effecting the one method from 15th day of the announcement month to the 14th day of the following month. The study focused on a one-year period between 1st October 2017 and 30th September 2018 and used an 11-day event window with the event day as the midpoint. The CAPM model was used to calculate the expected returns and the parameters of CAPM were calculated using the actual returns of the stocks included in the sample and the NASI index during the 365-day long estimation period between day -365 and day -5.

The results of the effects of the ERC's announcements as shown in the data analysis, results and discussions section indicated that during the twelve event windows across the one-year

period under scrutiny, there were significant abnormal returns around the dates in which the ERC's announcements were made. This provided evidence towards statistically significant effect of ERC's announcements on stock returns of stocks listed in the Petroleum and Energy sector of the NSE. Though not directly, these findings agree with the findings of Islam and Dooty (2015) who found a significant relationship between stock prices and earnings. As such since the ERC's announcements affects earnings of firms listed in the Petroleum and Energy sector, the results provide proof that petroleum products prices are also a determinant of stock returns for these firms. The findings also agree with Mureithi (2013) whose study showed that regulation of petroleum products prices have a significant impact on profitability of oil marketing companies.

On the international scene, the results agreed with the findings of Tella and Dyck (2008) and Chan (2001) both of whom found a significant impact of price capping decisions on stock prices. This indicates that whenever the ERC announces an increase in petroleum products prices, a positive impact is expected on the oil marketing companies such as KenolKobil Co. Limited and Total Kenya Limited leading to positive abnormal returns while a negative impact is expected on the heavy users of petroleum products such as Kenya Power & Lighting Co. Ltd and Kengen Co. Ltd leading to negative abnormal returns. However, the results showed that all the twelve events across the one-year period under scrutiny recorded significant abnormal returns though the direction of the effect differs from time to time. On average, the announcements led to a negative impact on the stock market returns of the firms in the petroleum and energy sector of the NSE. The results of the t-statistics indicate that such impact is statistically significant at 95% level of confidence.

The above findings agree with Julijana (2016) on market efficiency where the indication is that the NSE is inefficient in the semi strong form of market efficiency. These negated the findings of Brooks, Patel and Su (2003) who found efficiency in markets reacting to information immediately thus eliminating any possibility for generation of abnormal returns. Therefore, unlike the case in Brooks, Patel and Su (2003) and in agreement with Julijana (2016), Ahmed (2017) and Kimathi (2017) investors can make use of information reaching the NSE on the petroleum products prices to make significant abnormal returns around the dates in which such announcements are made.

5.3. Conclusion

The findings showed that ERC's announcements result in significant cumulative abnormal returns and cumulative mean abnormal returns for firms listed in the NSE's Petroleum and Energy sector across the twelve events scrutinized in the study indicating that the announcements have information content that investors can use to make abnormal returns around the announcement dates. This negates the theoretical assumption that stock markets are theoretically efficient thus no investor can make abnormal returns by trading on information contained in products prices announcements.

Therefore, the results of this study provide evidence that supports market inefficiency in the NSE especially in the Petroleum and Energy sector therefore indicating that ERC's announcements have a significant impact on the stock returns of firms listed in the above-mentioned sector. The varying nature in which the market reacts to the announcements where sometimes stocks of oil marketing firms react positively to petroleum products price increases and negatively to decreases while heavy users of petroleum products such as Kengen and KPLC react negatively to price increases and positively to increases is an

indicator of low ability to correctly analyze and interpret information contained in the announcements in line with the findings of Julijana (2016). This indicates that for investors to make use of this inefficiency in the NSE to make abnormal returns, ability to analyze and interpret the information is vital.

Results presented in appendix 3 and 4 indicates that the stock returns reaction to the announcements starts before the event date otherwise referred to as the pre-announcement period. This indicates that the abnormal returns could be driven by either insider trading or anticipation of the direction the prices will take based on the international oil prices which is a major variable in the calculation of petroleum products prices by the ERC before making the price announcements.

5.4. Limitations of the study

The study only focused on firms listed in the NSE yet there are other firms not listed in the NSE that operate in the Petroleum industry and as such are affected by the ERC's fuel price regulations. The study relied entirely on secondary data obtained from the NSE and the ERC's databases, therefore the reliability of the data is dependent on the accuracy of the source in capturing and storing such data across the period of the study.

The research methodology assumes that during the analysis period the data obtained follows a normal distribution. Therefore, the validity of the findings under this methodology is dependent on this assumption holding true. In addition, the analysis ignores all other factors that may influence the stock returns and only focusses on the ERC's announcements.

The ERC's announcements occur every month, therefore though caution was exercised by using a long estimation period (i.e. 365 trading days) to calculate the CAPM parameters therefore smoothing cyclical movements and effects of past announcements, the effect of past events may contaminate the estimation process thus affecting the validity of the findings.

5.5. Recommendations

5.5.1. Recommendation for policy makers

The findings show that the ERC's announcements have a significant impact on stock returns of stocks listed in the NSE petroleum and energy sector both collectively and individually. This indicates that investors can make use of information content of ERC's announcements to make abnormal gains. These abnormal gains start from pre-announcement period indicating that there could be possibility of insider trading on the stocks included in the sample. This calls for a re-evaluation of the Capital Market Authority (CMA)'s rules and procedures governing insider trading to curb possible insider within the NSE.

The findings of the study show the effect that ERC's announcements have on stock returns of firms listed in the NSE petroleum and Energy Sector, with the understanding of this effect in mind, ERC can incorporate the information in these findings in their formulation of petroleum products prices with an aim of increasing efficiency in the price regulation process.

5.5.2. Recommendation for future research

As shown in the data analysis, results and discussions, the ERC's announcements were found to have a significant impact on the stock returns of firms listed in the NSE Petroleum and Energy sector. However, the study relied on the CAPM parameters calculated during the estimation period to determine the expected returns for use in calculating the abnormal returns, yet the regression output showed that the NSE All Share Index (NASI) is a poor predictor of the stock returns of the firms included in the sample. The results presented in table 4.2. indicates that over 80% of the movement of stock prices of such firms included in the cannot be explained by the movement in the index prices. As such, there could be other factors that lead to the movement of stock prices other than the stock market's representative index. In addition to this, since some stocks such as UMME Limited which listed in the Petroleum and Energy Sector of the NSE but is thinly traded, they had to be eliminated from the sample and as such the effect of such thin trading could also be a factor affecting the low explanatory power of the index on the stock price movements. Therefore, future researchers may consider including the thinly traded stocks in their studies in order to improve the representativeness of the sample selected in different studies. In addition, though not available for developing countries such as Kenya, future researchers may consider using the Fama and French 3 factor model or the newly developed Fama and French 5 factor model to improve the explanatory power of the data used to calculate the CAPM parameters during the estimation period.

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APPENDICES

Appendix 1; ERC fuel price announcements

Date	Town	Super Petrol		Diesel		Kerosene	
		Price	% Change	Price	% Change	Price	% Change
14/10/2017	Nairobi	101.67		88.71		66.18	
14/11/2017	Nairobi	102.70	1.0%	92.41	4.2%	71.23	7.6%
14/12/2017	Nairobi	104.17	1.4%	92.44	0.0%	71.42	0.3%
14/01/2018	Nairobi	106.30	2.0%	94.82	2.6%	74.78	4.7%
14/02/2018	Nairobi	107.92	1.5%	96.96	2.3%	76.75	2.6%
14/03/2018	Nairobi	107.46	-0.4%	97.86	0.9%	77.45	0.9%
14/04/2018	Nairobi	106.83	-0.6%	97.86	0.0%	76.72	-0.9%
14/05/2018	Nairobi	107.17	0.3%	98.64	0.8%	78.22	2.0%
14/06/2018	Nairobi	108.81	1.5%	103.60	5.0%	84.10	7.5%
14/07/2018	Nairobi	112.20	3.1%	103.25	-0.3%	85.73	1.9%
14/08/2018	Nairobi	127.80	13.9%	115.08	11.5%	97.41	13.6%
14/09/2018	Nairobi	116.79	-8.6%	108.12	-6.0%	108.41	11.3%

Appendix 2: Normality test results during estimation period calculated using GRETL software

Test for normality of Sept2018Event: Doornik-Hansen test = 23.1315, with p-value 9.48547e-006 Shapiro-Wilk W = 0.979964, with p-value 6.66387e-005 Lilliefors test = 0.058335, with p-value ~= 0 Jarque-Bera test = 40.4318, with p-value 1.66092e-009	**Test for normality of Aug2018Event:** Doornik-Hansen test = 21.5399, with p-value 2.1022e-005 Shapiro-Wilk W = 0.981829, with p-value 0.000165984 Lilliefors test = 0.0533378, with p-value ~= 0.01 Jarque-Bera test = 33.1287, with p-value 6.40015e-008	**Test for normality of July2018Event:** Doornik-Hansen test = 19.6988, with p-value 5.278e-005 Shapiro-Wilk W = 0.981435, with p-value 0.000136432 Lilliefors test = 0.0578031, with p-value ~= 0 Jarque-Bera test = 32.1537, with p-value 1.04211e-007
Test for normality of June2018Event: Doornik-Hansen test = 18.7119, with p-value 8.64501e-005 Shapiro-Wilk W = 0.981045, with p-value 0.000112584 Lilliefors test = 0.0616664, with p-value ~= 0	**Test for normality of May2018Event:** Doornik-Hansen test = 21.0285, with p-value 2.71473e-005 Shapiro-Wilk W = 0.977279, with p-value 1.91068e-005 Lilliefors test = 0.0722538, with p-value ~= 0	**Test for normality of April2018Event:** Doornik-Hansen test = 22.0187, with p-value 1.65461e-005 Shapiro-Wilk W = 0.977258, with p-value 1.89216e-005 Lilliefors test = 0.0681721, with p-value ~= 0

Jarque-Bera test = 34.0487, with p-value 4.04038e-008	Jarque-Bera test = 41.1545, with p-value 1.1572e-009	Jarque-Bera test = 43.1848, with p-value 4.19306e-010
Test for normality of Mar2018Event: Doornik-Hansen test = 21.347, with p-value 2.31499e-005 Shapiro-Wilk W = 0.975053, with p-value 7.1453e-006 Lilliefors test = 0.0737357, with p-value ~= 0 Jarque-Bera test = 45.2221, with p-value 1.51405e-010	**Test for normality of Feb2018Event:** Doornik-Hansen test = 24.4502, with p-value 4.90576e-006 Shapiro-Wilk W = 0.978061, with p-value 2.72817e-005 Lilliefors test = 0.0724471, with p-value ~= 0 Jarque-Bera test = 37.7095, with p-value 6.47871e-009	**Test for normality of Jan2018Event:** Doornik-Hansen test = 23.6826, with p-value 7.20088e-006 Shapiro-Wilk W = 0.978884, with p-value 3.99653e-005 Lilliefors test = 0.0676405, with p-value ~= 0 Jarque-Bera test = 36.1315, with p-value 1.42605e-008
Test for normality of Dec2017Event: Doornik-Hansen test = 25.7809, with p-value 2.52203e-006 Shapiro-Wilk W = 0.975833, with p-value 1.00312e-005 Lilliefors test = 0.0753354, with p-value ~= 0 Jarque-Bera test = 40.6773, with p-value 1.46901e-009	**Test for normality of Nov2017Event:** Doornik-Hansen test = 26.3811, with p-value 1.86815e-006 Shapiro-Wilk W = 0.978225, with p-value 2.94286e-005 Lilliefors test = 0.0721783, with p-value ~= 0 Jarque-Bera test = 39.95, with p-value 2.11337e-009	**Test for normality of Oct2017Event:** Doornik-Hansen test = 30.904, with p-value 1.94667e-007 Shapiro-Wilk W = 0.976174, with p-value 1.16597e-005 Lilliefors test = 0.0682166, with p-value ~= 0 Jarque-Bera test = 47.1919, with p-value 5.65457e-011

Appendix 3; Abnormal returns during the event windows

Sept 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	1.6%	3.2%	1.7%	-1.0%	0.3%
+4	-4.5%	5.5%	8.4%	1.1%	0.2%
+3	-0.5%	3.0%	0.5%	-0.5%	0.0%
+2	-0.5%	-0.9%	-1.2%	6.0%	0.9%
+1	0.2%	0.4%	1.6%	6.6%	2.0%
0	-1.3%	5.3%	-4.7%	-5.7%	-1.3%
-1	0.0%	1.0%	-0.9%	-0.4%	-0.8%
-2	-0.3%	-2.6%	-3.1%	-0.8%	-2.0%
-3	0.0%	-0.3%	0.4%	2.1%	0.0%
-4	1.9%	0.9%	-0.9%	-6.5%	-1.5%
-5	2.0%	0.2%	-0.7%	2.8%	0.7%

Aug 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-0.3%	-0.6%	0.1%	0.6%	0.0%
+4	0.0%	1.7%	2.6%	-0.2%	1.0%
+3	-0.7%	0.6%	-2.5%	-1.1%	-0.9%
+2	0.3%	0.3%	-1.4%	-0.9%	-0.4%
+1	-0.4%	0.8%	1.6%	-1.8%	0.1%
0	0.1%	-1.8%	-0.2%	3.0%	0.3%
-1	-1.8%	-0.9%	2.4%	-0.3%	-0.2%
-2	0.1%	-0.4%	-1.3%	-1.7%	-0.8%
-3	-0.1%	-0.1%	0.8%	-0.2%	0.1%
-4	-0.7%	5.7%	2.0%	-0.5%	1.6%
-5	0.5%	1.6%	-1.7%	-0.2%	0.0%

July 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	1.0%	0.5%	3.8%	-0.8%	1.1%
+4	0.6%	-1.1%	-4.2%	0.5%	-1.0%
+3	-1.9%	0.4%	-1.0%	-0.3%	-0.7%
+2	-0.8%	-1.2%	-2.6%	7.4%	0.7%
+1	0.5%	0.0%	0.1%	2.5%	0.8%
0	-0.1%	-0.1%	0.0%	-0.2%	-0.1%
-1	-0.6%	0.1%	0.2%	-0.1%	-0.1%
-2	-1.2%	0.1%	-0.6%	0.7%	-0.2%
-3	0.5%	0.6%	0.5%	0.9%	0.6%
-4	0.2%	-1.6%	0.7%	-6.9%	-1.9%
-5	0.3%	0.3%	-4.6%	-0.3%	-1.1%

June 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-0.5%	-2.3%	-0.6%	-2.8%	-1.6%
+4	-0.1%	0.0%	-1.4%	-0.2%	-0.4%
+3	0.5%	0.5%	1.0%	-2.0%	0.0%
+2	-0.7%	2.1%	1.2%	5.7%	2.1%
+1	-1.1%	0.2%	0.2%	-4.6%	-1.3%
0	1.6%	-0.7%	4.6%	-0.9%	1.2%
-1	-1.7%	0.0%	1.6%	1.3%	0.3%
-2	-1.7%	-2.7%	3.2%	2.9%	0.4%
-3	1.3%	-4.4%	-3.4%	0.4%	-1.6%
-4	-0.5%	-0.5%	-3.5%	-0.9%	-1.4%
-5	-0.1%	9.8%	-0.8%	-1.8%	1.8%

May 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	7.0%	0.5%	0.5%	-3.8%	1.1%
+4	-0.2%	0.4%	0.7%	-4.6%	-0.9%
+3	-2.7%	0.8%	-1.0%	-2.5%	-1.3%
+2	-1.8%	-4.3%	-1.5%	0.1%	-1.9%
+1	-2.1%	-1.8%	1.0%	0.6%	-0.6%
0	1.7%	1.1%	-1.7%	2.2%	0.8%
-1	-2.4%	-0.7%	-0.9%	-4.2%	-2.1%
-2	1.1%	0.4%	0.9%	4.5%	1.8%
-3	1.1%	-1.6%	-1.3%	-0.5%	-0.6%
-4	1.0%	-0.5%	0.2%	4.4%	1.3%
-5	1.0%	0.6%	0.1%	-8.6%	-1.7%

April 2018 Event (Abnormal Returns)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	0.9%	-0.9%	0.3%	2.3%	0.7%
+4	-1.8%	0.4%	0.4%	2.3%	0.3%
+3	1.7%	-1.0%	0.6%	-2.4%	-0.3%
+2	0.1%	0.4%	-0.6%	-6.6%	-1.6%
+1	1.3%	0.0%	-0.8%	0.0%	0.1%
0	-0.1%	-0.1%	0.1%	-0.2%	-0.1%
-1	-0.4%	0.5%	0.4%	-0.8%	-0.1%
-2	0.1%	0.4%	-0.9%	1.4%	0.3%
-3	-0.5%	1.3%	-0.2%	-1.0%	-0.1%
-4	0.2%	-0.1%	-0.6%	-0.2%	-0.2%
-5	-0.4%	0.0%	2.4%	0.7%	0.7%

Mar 2018 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-1.5%	-0.7%	2.3%	1.4%	0.4%
+4	-0.4%	0.4%	-2.8%	1.4%	-0.4%
+3	2.4%	-1.0%	2.9%	-0.3%	1.0%
+2	2.1%	-0.5%	-0.8%	-0.2%	0.1%
+1	0.3%	1.9%	-1.8%	0.7%	0.3%
0	-0.5%	-0.3%	-0.8%	4.2%	0.7%
-1	0.0%	1.1%	-0.9%	3.4%	0.9%
-2	0.1%	0.3%	1.8%	-6.2%	-1.0%
-3	0.3%	0.8%	-1.2%	0.7%	0.2%
-4	0.6%	0.9%	-1.1%	2.6%	0.7%
-5	0.9%	0.7%	0.5%	-0.2%	0.5%

Feb 2018 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	3.5%	1.1%	-0.6%	-1.0%	0.8%
+4	1.0%	1.3%	0.3%	-0.3%	0.6%
+3	0.6%	-0.1%	0.0%	-0.1%	0.1%
+2	-0.6%	-1.7%	-2.1%	-0.3%	-1.2%
+1	1.0%	-1.2%	0.1%	-0.1%	-0.1%
0	-2.1%	-0.2%	-1.3%	-0.2%	-1.0%
-1	1.9%	-0.2%	-0.7%	-0.2%	0.2%
-2	-0.1%	1.7%	-0.7%	0.1%	0.2%
-3	0.3%	-1.1%	0.1%	0.7%	0.0%
-4	-0.4%	3.0%	0.2%	3.1%	1.5%
-5	1.7%	-2.2%	0.0%	7.7%	1.8%

Jan 2018 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-0.3%	-0.5%	-0.3%	-1.3%	-0.6%
+4	0.5%	-0.9%	-0.7%	-0.2%	-0.3%
+3	-1.1%	0.0%	-2.2%	-0.1%	-0.9%
+2	-0.2%	-0.8%	-0.1%	-0.2%	-0.3%
+1	0.4%	-1.0%	-2.4%	-2.2%	-1.3%
0	-0.1%	0.0%	0.0%	-0.1%	-0.1%
-1	0.3%	-1.2%	-0.9%	1.7%	0.0%
-2	-0.8%	-0.2%	2.7%	2.9%	1.1%
-3	1.0%	0.1%	-1.0%	-2.1%	-0.5%
-4	-1.1%	2.3%	0.0%	-0.2%	0.2%
-5	1.0%	0.6%	0.0%	-0.1%	0.4%

Dec 2017 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-2.4%	-0.5%	-0.9%	-3.4%	-1.8%
+4	-0.4%	-0.6%	0.0%	-0.1%	-0.3%
+3	0.0%	0.1%	-0.4%	-3.1%	-0.9%
+2	0.1%	-0.8%	-0.7%	-0.9%	-0.6%
+1	-1.4%	1.3%	-0.9%	0.0%	-0.3%
0	0.1%	0.9%	0.3%	2.0%	0.8%
-1	-2.9%	1.0%	0.4%	2.1%	0.2%
-2	1.2%	0.3%	-0.7%	-0.2%	0.1%
-3	-3.1%	-0.7%	-1.6%	-0.1%	-1.4%
-4	-0.3%	0.1%	-2.3%	-2.3%	-1.2%
-5	-0.1%	-2.5%	-0.6%	-5.9%	-2.3%

Nov 2017 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-0.7%	0.0%	-0.8%	1.5%	0.0%
+4	-0.1%	1.1%	-0.4%	3.8%	1.1%
+3	-0.2%	0.3%	-0.2%	-0.2%	-0.1%
+2	-0.3%	2.0%	1.7%	7.6%	2.8%
+1	-0.7%	-1.2%	-2.3%	-6.5%	-2.7%
0	-0.4%	0.0%	-0.4%	-1.1%	-0.5%
-1	0.0%	-0.5%	0.2%	0.0%	-0.1%
-2	-1.6%	0.1%	0.2%	0.0%	-0.3%
-3	1.6%	-2.9%	0.5%	-0.1%	-0.2%
-4	-0.6%	-2.5%	0.3%	-0.2%	-0.7%
-5	0.5%	-0.1%	-0.5%	1.2%	0.3%

Oct 2017 Event (Abnormal Returns)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-1.0%	2.1%	0.3%	-5.9%	-1.1%
+4	0.2%	-6.4%	1.5%	0.2%	-1.1%
+3	-2.3%	-0.9%	0.2%	-5.3%	-2.1%
+2	0.8%	0.3%	-2.3%	2.3%	0.3%
+1	2.4%	0.8%	-0.3%	-3.2%	-0.1%
0	-0.1%	0.0%	0.0%	-0.1%	0.0%
-1	-0.1%	-0.6%	-0.5%	3.2%	0.5%
-2	-3.3%	-1.5%	0.7%	0.0%	-1.0%
-3	-2.5%	-1.4%	-1.2%	-1.0%	-1.5%
-4	-3.2%	1.2%	-0.4%	0.0%	-0.6%
-5	-0.5%	2.8%	0.0%	2.1%	1.1%

Appendix 4; Cumulative abnormal returns during the event windows

Sept 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-1.3%	15.6%	1.2%	3.8%	-1.4%
+4	-2.9%	12.5%	-0.4%	4.8%	-1.7%
+3	1.6%	6.9%	-8.8%	3.7%	-1.9%
+2	2.1%	4.0%	-9.3%	4.2%	-1.9%
+1	2.6%	4.9%	-8.2%	-1.8%	-2.9%
0	2.4%	4.5%	-9.7%	-8.4%	-4.9%
-1	3.7%	-0.8%	-5.1%	-2.7%	-3.6%
-2	3.6%	-1.8%	-4.2%	-2.4%	-2.7%
-3	4.0%	0.8%	-1.1%	-1.6%	-0.8%
-4	4.0%	1.1%	-1.5%	-3.7%	-0.8%
-5	2.0%	0.2%	-0.7%	2.8%	0.7%

Aug 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-3.1%	6.9%	2.6%	-3.3%	0.8%
+4	-2.8%	7.5%	2.4%	-3.9%	0.8%
+3	-2.7%	5.8%	-0.2%	-3.8%	-0.2%
+2	-2.0%	5.2%	2.3%	-2.7%	0.7%
+1	-2.3%	4.9%	3.7%	-1.7%	1.1%
0	-2.0%	4.1%	2.1%	0.1%	1.1%
-1	-2.1%	5.9%	2.2%	-2.9%	0.8%
-2	-0.2%	6.9%	-0.2%	-2.6%	1.0%
-3	-0.3%	7.2%	1.1%	-0.9%	1.8%
-4	-0.2%	7.3%	0.3%	-0.7%	1.7%
-5	0.5%	1.6%	-1.7%	-0.2%	0.0%

July 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-1.5%	-1.8%	-7.5%	3.4%	-1.8%
+4	-2.5%	-2.3%	-11.3%	4.2%	-3.0%
+3	-3.1%	-1.2%	-7.1%	3.7%	-2.0%
+2	-1.2%	-1.6%	-6.1%	4.0%	-1.2%
+1	-0.4%	-0.5%	-3.6%	-3.4%	-1.9%
0	-0.9%	-0.5%	-3.7%	-5.8%	-2.7%
-1	-0.8%	-0.4%	-3.7%	-5.7%	-2.6%
-2	-0.2%	-0.6%	-3.9%	-5.5%	-2.6%
-3	1.0%	-0.6%	-3.3%	-6.3%	-2.3%
-4	0.5%	-1.2%	-3.9%	-7.2%	-2.9%
-5	0.3%	0.3%	-4.6%	-0.3%	-1.1%

June 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	-2.9%	1.9%	2.2%	-3.0%	-0.5%
+4	-2.4%	4.2%	2.8%	-0.2%	1.1%
+3	-2.3%	4.2%	4.2%	0.0%	1.5%
+2	-2.8%	3.8%	3.2%	2.0%	1.5%
+1	-2.1%	1.6%	2.0%	-3.7%	-0.6%
0	-1.0%	1.5%	1.8%	0.9%	0.8%
-1	-2.7%	2.2%	-2.8%	1.8%	-0.4%
-2	-1.0%	2.1%	-4.5%	0.5%	-0.7%
-3	0.7%	4.8%	-7.7%	-2.3%	-1.1%
-4	-0.6%	9.3%	-4.3%	-2.7%	0.4%
-5	-0.1%	9.8%	-0.8%	-1.8%	1.8%

May 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	3.8%	-5.0%	-2.9%	-12.2%	-4.1%
+4	-3.2%	-5.5%	-3.4%	-8.5%	-5.1%
+3	-3.0%	-5.9%	-4.1%	-3.9%	-4.2%
+2	-0.3%	-6.7%	-3.1%	-1.4%	-2.9%
+1	1.5%	-2.4%	-1.7%	-1.6%	-1.0%
0	3.6%	-0.7%	-2.6%	-2.2%	-0.5%
-1	1.9%	-1.8%	-1.0%	-4.3%	-1.3%
-2	4.3%	-1.1%	0.0%	-0.1%	0.8%
-3	3.1%	-1.5%	-1.0%	-4.7%	-1.0%
-4	2.0%	0.1%	0.4%	-4.1%	-0.4%
-5	1.0%	0.6%	0.1%	-8.6%	-1.7%

April 2018 Event (CAR)					
Day	**KENO**	**KEGN**	**KPLC**	**TOTL**	**EWP**
+5	1.0%	1.1%	1.2%	-4.5%	-0.3%
+4	0.1%	1.9%	0.9%	-6.7%	-1.0%
+3	1.9%	1.5%	0.5%	-9.1%	-1.3%
+2	0.3%	2.6%	-0.1%	-6.7%	-1.0%
+1	0.2%	2.1%	0.5%	-0.1%	0.7%
0	-1.1%	2.1%	1.3%	-0.1%	0.6%
-1	-1.0%	2.2%	1.2%	0.1%	0.6%
-2	-0.6%	1.7%	0.8%	0.9%	0.7%
-3	-0.7%	1.3%	1.7%	-0.5%	0.4%
-4	-0.2%	-0.1%	1.8%	0.5%	0.5%
-5	-0.4%	0.0%	2.4%	0.7%	0.7%

Mar 2018 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	4.4%	3.7%	-1.8%	7.5%	3.5%
+4	5.9%	4.4%	-4.2%	6.1%	3.1%
+3	6.3%	4.0%	-1.3%	4.7%	3.4%
+2	3.9%	5.0%	-4.2%	5.0%	2.4%
+1	1.8%	5.4%	-3.4%	5.2%	2.3%
0	1.5%	3.5%	-1.6%	4.5%	2.0%
-1	2.0%	3.9%	-0.8%	0.3%	1.3%
-2	2.0%	2.7%	0.0%	-3.1%	0.4%
-3	1.9%	2.4%	-1.8%	3.1%	1.4%
-4	1.6%	1.6%	-0.6%	2.3%	1.2%
-5	0.9%	0.7%	0.5%	-0.2%	0.5%

Feb 2018 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	6.8%	0.5%	-4.7%	9.3%	3.0%
+4	3.3%	-0.6%	-4.1%	10.3%	2.2%
+3	2.2%	-2.0%	-4.4%	10.6%	1.6%
+2	1.6%	-1.9%	-4.5%	10.7%	1.5%
+1	2.2%	-0.2%	-2.4%	11.0%	2.7%
0	1.3%	1.0%	-2.4%	11.2%	2.7%
-1	3.4%	1.2%	-1.1%	11.4%	3.7%
-2	1.5%	1.4%	-0.5%	11.6%	3.5%
-3	1.6%	-0.3%	0.3%	11.5%	3.3%
-4	1.3%	0.8%	0.2%	10.8%	3.3%
-5	1.7%	-2.2%	0.0%	7.7%	1.8%

Jan 2018 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-0.5%	-1.5%	-5.0%	-1.9%	-2.2%
+4	-0.2%	-1.0%	-4.7%	-0.7%	-1.6%
+3	-0.6%	-0.1%	-4.0%	-0.5%	-1.3%
+2	0.5%	-0.1%	-1.8%	-0.3%	-0.4%
+1	0.6%	0.7%	-1.7%	-0.1%	-0.1%
0	0.2%	1.7%	0.7%	2.0%	1.2%
-1	0.3%	1.7%	0.7%	2.2%	1.2%
-2	0.0%	2.9%	1.7%	0.5%	1.3%
-3	0.8%	3.0%	-1.0%	-2.4%	0.1%
-4	-0.2%	3.0%	0.0%	-0.3%	0.6%
-5	1.0%	0.6%	0.0%	-0.1%	0.4%

Dec 2017 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-9.3%	-1.4%	-7.4%	-11.9%	-7.5%
+4	-6.9%	-0.9%	-6.6%	-8.5%	-5.7%
+3	-6.5%	-0.3%	-6.6%	-8.4%	-5.5%
+2	-6.4%	-0.3%	-6.2%	-5.3%	-4.6%
+1	-6.6%	0.4%	-5.4%	-4.4%	-4.0%
0	-5.2%	-0.9%	-4.5%	-4.4%	-3.7%
-1	-5.3%	-1.7%	-4.8%	-6.4%	-4.6%
-2	-2.4%	-2.7%	-5.2%	-8.6%	-4.7%
-3	-3.6%	-3.1%	-4.5%	-8.3%	-4.9%
-4	-0.5%	-2.3%	-2.9%	-8.2%	-3.5%
-5	-0.1%	-2.5%	-0.6%	-5.9%	-2.3%

Nov 2017 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-2.4%	-3.7%	-1.7%	6.0%	-0.4%
+4	-1.6%	-3.7%	-0.8%	4.5%	-0.4%
+3	-1.6%	-4.8%	-0.4%	0.7%	-1.5%
+2	-1.4%	-5.1%	-0.3%	0.8%	-1.5%
+1	-1.1%	-7.1%	-2.0%	-6.7%	-4.2%
0	-0.4%	-5.9%	0.3%	-0.2%	-1.5%
-1	0.0%	-5.9%	0.7%	0.9%	-1.1%
-2	0.0%	-5.4%	0.5%	0.9%	-1.0%
-3	1.6%	-5.6%	0.3%	0.9%	-0.7%
-4	0.0%	-2.7%	-0.2%	1.0%	-0.5%
-5	0.5%	-0.1%	-0.5%	1.2%	0.3%

Oct 2017 Event (CAR)					
Day	KENO	KEGN	KPLC	TOTL	EWP
+5	-9.7%	-3.7%	-2.2%	-7.8%	-5.8%
+4	-8.6%	-5.8%	-2.5%	-1.9%	-4.7%
+3	-8.9%	0.6%	-3.9%	-2.0%	-3.6%
+2	-6.6%	1.5%	-4.1%	3.3%	-1.5%
+1	-7.3%	1.2%	-1.8%	1.0%	-1.7%
0	-9.8%	0.5%	-1.5%	4.2%	-1.7%
-1	-9.7%	0.5%	-1.5%	4.3%	-1.6%
-2	-9.5%	1.1%	-1.0%	1.1%	-2.1%
-3	-6.2%	2.6%	-1.7%	1.0%	-1.1%
-4	-3.7%	3.9%	-0.5%	2.1%	0.5%
-5	-0.5%	2.8%	0.0%	2.1%	1.1%