THE RELATIONSHIP BETWEEN OIL PRICES AND SHARE PRICES OF LISTED MANUFACTURING FIRMS IN KENYA

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ABSTRACT

Oil prices comprise a significant cost component in manufacturing firms and this affects their bottom line. The main objective of this study was to find out how oil prices products; crude oil, diesel, and LPG affect the share price index of the listed manufacturing firms in Kenya. However, less is known about this relationship in Kenya. Oil transmission mechanism theory, equity pricing theory and efficient market hypothesis are the major theoretical reviews used in this study. This study adopted the use of descriptive research design to evaluate the relationship between oil prices and share prices of listed manufacturing firms in Kenya. A descriptive design was adopted since the author had no control over the variables and the variables were quantitatively tested and analyzed. The study used monthly data from September 2013 to August 2017. The target population was all 10 listed manufacturing firms in Kenya. The study used the census as data sampling technique. Census is normally considered as a complete count. Tables and figures were used for data presentation. The share prices of the listed manufacturing companies were obtained from NSE and a monthly average of eight listed manufacturing firms was obtained which was used as an index. Crude oil prices, LPG and diesel prices were obtained from E.I.A. All the prices were in Kenya shillings. The study used a vector autoregression model to establish the relationship between oil prices; LPG and diesel with the share prices index of the listed manufacturing firms in Kenya. VAR model is normally used when time series data are not stationary and not co-integrated. This study found out that crude oil prices have a short run positive relationship with the share prices of the listed manufacturing firms in Kenya. Diesel prices have a short run negative relationship with the share prices index of the listed manufacturing firms in Kenya while LPG prices have a significant short-run positive relationship with the share prices index of listed manufacturing firms in Kenya. Further, the study used impulse response functions and variance decomposition to evaluate the impact of LPG and diesel shocks on the share prices index of the listed manufacturing firms in Kenya. The results from impulse response function and variance decomposition supported the vector autoregression results. The study concludes that Crude oil and LPG prices have a positive relationship and a positive effect on the share prices index of the listed manufacturing firms. Diesel on the other has a negative relationship and a negative effect on the share prices index of the listed manufacturing firms in Kenya. Based on the results obtained from this study, further research should be carried out to incorporate more periods. Also, to get a vivid picture of how oil prices affect financial performance directly, the relationship between oil prices and the profitability of manufacturing firms should be looked at. Finally, this study recommends that further studies should be carried out on the relationship between oil prices and other sectors.

Key words: crude oil, diesel, LPG, share prices, VAR, Impulse response function, Variance decomposition

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DEFINITION OF TERMS

Crude Oil: It is the main product that is mined and refined in to other petroleum products. The study focused on Murban crude oil prices since that is where Kenya imports its oil products from.

Diesel: It is one of the refined products of crude oil. It is used for vehicles to power their engines and also in generators. To a greater extend, used as a substitute to electricity in case of low hydropower. The study focused on Murban diesel prices since that is where Kenya imports its oil products from.

LPG: It stands for liquefied petroleum gas and it is also known as propane. It is also an extract of crude oil though compressed. It is cheaper than other petroleum products and has attractive qualities that make it preferable by most users. The study focused on Murban LPG prices since that is where Kenya imports its oil products from.

Share prices: Shares represent an ownership of a firm. The amount at which an ownership cost is called a share price. In this study, the focus is on the share prices of the listed manufacturing firms.

LIST OF ACRONYMS

ERC- Energy Regulatory Commission

EMH- Efficient Market Hypothesis

G-7 - Great seven countries

GARCH- Generalized Autoregressive Conditional Heteroskedasticity

GDP- Gross Domestic Product

KPRL- Kenya Petroleum Refinery Limited

O.L.S- Ordinary Least Squares

O.P.E.C- Organization of Petroleum Export Countries

P.I.E.A- Petroleum Institute of East Africa Limited

A.P.I- American Petroleum Institute

E.I.A- Energy Information Authority

H.F.O- Heavy Fuel Oil

I.D.O- Industrial Diesel Oil

L.P.G- Liquefied Petroleum Gas

ROA- Return on Asset

ROE- Return on Equity

UNCTAD- United Nations Conference on Trade Association

USD- United States Dollar

VAR- Vector Autoregression

VECM- Vector Error Correction Model

ADF- Augmented Dickey Fuller

IRF- Impulse Response Function

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CHAPTER ONE

INTRODUCTION

1.1 Background of Study

The cost of doing business significantly affects the financial performance of manufacturing entities. Among other variables, oil is an essential contributor to the costs incurred in manufacturing processes. The cost of oil contributes to the cost of electricity, the cost of generating steam, hot air and compressed air in factories, movement of cargo by folk lifts within factories and transportation of finished products. It, therefore, follows that changes in oil prices are likely to impact on the cost of doing the business of manufacturing companies (Onuonga, Etyang & Mwabu, 2011).

Investors are always attracted to the firms that financially perform well. Through good financial performance, companies are able to attract investors interested in the equity market. A firm's share price is a reflection of a firm's performance (Shamsudin & Mahmood, 2013). Increase in the cost of doing business affects the financial performance of a publicly listed company and this may reflect in share prices, making it unattractive to potential investors. Since there is likelihood that oil prices affect the cost of doing business, it is likely that they also affect the share price of manufacturing firms. However, this relationship is not known (Gill, Singh, Mathur & Mand, 2014).

According to Osoro & Ogeto (2014), a firm's financial performance relies largely on the economic ambience of a country. Since oil affects the economy, it is clear that it also affects the financial performance of a firm. Companies that intensively use electricity and oil in their

processes and transportation of goods are affected by oil price fluctuation (Sardosky, 2001; Boyer & Filion, 2004).

This study aims to find out the relationship between the prices of various oil products and the financial performance of listed manufacturing companies in Kenya. The study will focus on share prices of the firms as an indicator of their financial performance, using the equity pricing theory. Although there are significant studies that have been carried out to assess the relationship between oil prices and the financial performance of companies, there are limited studies that focus on this relationship in the Kenyan market.

For over 150 years crude oil has been part and parcel of human lives. Over 90% of transportation fuel used in the world is derived from crude oil. Companies in the manufacturing sector, ranging from plastics to medicine production, use oil in their operations. The modern oil industry began in the 19th century when Colonel Edwin Drake discovered the first underground reservoir near Titusville, Pennsylvania in the United States of America. After some research, oil started receiving more attention from the scientific community and eventually products were developed from crude oil. The first product developed from crude oil was kerosene which was followed by gasoline and diesel which are sold as retail oil products to consumers to this date (OPEC, 2013).

Oil prices substantially contribute to the operating expenditure of an organization. For instance, if the oil prices increase, companies will have to spend more in costs related to electricity, transportation of goods and raw materials, bulk handling of products and generation of utilities like steam, hot and compressed air. This will, in turn, affect the bottom line of the organization. In this case, therefore, oil price fluctuation might have an effect on the financial

performance of an organization hence reducing the value of share prices (Onuonga, Etyang & Mwabu, 2011; Shamsudin & Mahmood, 2013).

Despite oil playing an important part in the economies of the world, its price has remained uncertain and this has the potential to adversely impact most economies. According to UNCTAD (2005), oil price volatility does not only affect oil import countries but also oil export countries. Prior to 1972 for instance, the United States witnessed an economic recession that was mainly caused by oil price volatility (Murphy & Hall, 2011). Labys (2006) asserts that notwithstanding the consumers, the commodity producers, individuals or multinational corporations, energy price fluctuations affect almost all people in the world. For example, high energy prices cause consumers to cut down their budget allocation, transportation becomes restrictive to normal passengers due to high fares and freight charges as a result of high gasoline prices, people can no longer afford heating bills, manufacturers who do not have rapid energy substitutes face constant and costly disruptions and this ultimately leads to increased commodity prices hence inflation.

Since 1973, global oil price shocks have been witnessed. The first major oil shock in the world happened in 1973 because OPEC nixed oil exports due to Arab-Israeli war. This saw global crude oil prices rise from $4.15 to $9.07 per barrel in 1974. The second world crude oil price shock occurred as a result of the Sardonic revolution that saw the end of the sovereignty of Shah which decreased the production of oil in Iran. As a result, oil prices shot up from $12.46 in 1978 to $35.24 per barrel in 1981.The third big global oil prices shock has been experienced since 1999 (Subhani, Hassan, Pavi & Osman, 2012). According to Kojima (2009); Dhaoui & Khraief (2014), fuel prices have been on the increase especially in the period between 2000 and 2009. For instance, the price of oil per barrel rose from $60 in 2007 to $100 in 2008 reaching a

record high of $147 in July 2008. It then dropped to $115 in August and by December 2008 it closed at $45. Again in April 2009, it rose to $45 per barrel and by August 2009 it was above $70 per barrel. This led to government interventions in setting up price ceilings so as to protect consumers due to the pass-through effect of kerosene and gasoline.

According to Kilian (2010), just as it is impossible to predict the price of crude oil, it is also impossible to predict the price of its end products sold at wholesale and retail prices. The periods between 2002 and mid-2008 United States witnessed higher volatility of retail oil prices. Some of the reasons put forward by Kilian for this were increased demand for global commodity markets, precautionary demand shocks specific to the oil industry and adverse supply shocks in United States Refinery. In January 2004, the world monthly gasoline price increased from US$0.26 a liter to US$0.37 in January 2007 and in January 2008, it increased to US$ 0.83. Diesel prices on the other hand in January 2004, increased by US$0.25 a liter, in 2007 January, it increased by US$0.42 and in January 2008, it rose by US$0.84 a liter. During this period, some countries witnessed large currency appreciation which partially covered the increases in oil prices. Some countries, on the other hand, faced currency depreciation due to steep oil prices.

In August 2008, in oil importing countries, prices of gasoline, diesel, and household kerosene prices were twice as high as those in oil exporting countries. In fact, the sub-Saharan region had the highest gasoline and diesel prices in developing countries (Kojima, 2009). Kenya is no exception to retail oil prices volatility. Since 2005, petroleum pump prices have been rising at a relatively higher rate than crude oil implying a cartel-like pricing approach by major oil companies (Keiyah, 2011).

Oil price volatility is one of the factors that affect consumers, producers, and market especially in terms of costs, trading strategies and incentives to launch new investment. For a

period of time, oil price volatility has been on the radar of the most financial practitioners and market participants for two major reasons. Firstly, it affects significantly the decisions made by producers and consumers in strategic planning and project appraisals. Secondly, it determines investors' decisions in oil-related activities, portfolio management and risk management (Dhaoui & Khraeif, 2014).

According to Arouri et al. (2011), oil prices volatility affect sectors of the economy differently. It depends on whether oil serves as an input or output, its exposure to indirect oil price effects, competition, and concentration and its capacity to absorb and pass on oil price risk to its consumers. When oil prices increase, the cost of production also increases for companies that directly or indirectly use oil as an input. Assuming that firms transfer all the rising costs to their consumers or investors, profits are bound to shrink hence reducing expected returns (Broadstock, Cao & Zhang, 2012). According to Onuonga et al. (2011), most manufacturing firms' processes in Kenya use industrial diesel oil and heating fuel oil in their thermal energy requirements. Therefore, when oil prices fluctuate, it poses a risk to the manufacturing sector.

1.1.1 Manufacturing firms in Kenya

The manufacturing sector is one of the significant contributors to the economic well-being of Kenya. It is the heart of industrialization in Kenya. It is also one of the fastest growing sectors and a major source of employment. Most manufacturing activities in Kenya are situated in the major cities; Mombasa, Nairobi, and Kisumu. In the manufacturing sector, there are a lot of sub-sectors under it. These sub-sectors include; food processing (grain milling, beer production, and sugar cane crushing), fabrication of consumer goods such as vehicles from kits and crude oil refinery. These sub-sectors are mainly formal. There has also been developed in

informal sectors which use low technology in their processes but also play a vital role in Kenya's economy. Most manufacturing firms output in Kenya is geared towards satisfying basic needs which include clothing, furniture, foodstuffs and motor vehicle repairs. Among the sub-sectors, food processing is the one that contributes most to Kenya's GDP (Chege, Ngui & Kimuyu, 2013).

The manufacturing sector in Kenya contributes approximately 10% of Kenya's GDP and its growth has been on an upward trend. For instance, in the period between 1970 and 2005, it has been growing at 8%. In terms of energy consumption, the manufacturing sector is the third-largest energy end user in Kenyan economy, the second largest user of petroleum products after transport sector and largest consumer of electricity industries (Onuonga et al. 2011). According to Deloitte (2016), the manufacturing sector is the key to realizing Kenya's vision 2030. As per 2016, the manufacturing sector contributed 14% of Kenya's GDP. Deloitte agrees with Onuonga et al. (2011) that the cost of energy and labor costs are some of the greatest hindrances in the manufacturing sector in Kenya. Olingo (2014) posited that most manufacturing firms are adversely affected by the high cost of production. He cited the case of Cadbury which by then was about to relocate its major operations to Egypt due to a low cost of production favored by low energy cost.

In Kenya, there are ten listed manufacturing firms at the Nairobi Securities Exchange Limited. The ten listed manufacturing firms are unique in the business they engage in. This businesses, range from agricultural products to manufacturing plastic products. In addition, the manufacturing firms listed have different share prices with British American Tobacco having the highest share price (NSE, 2018)

1.1.2 Share Prices

Companies are affected by the economic ambience and this ambience determines how a firm's financial performance is affected (Osoro et al. 2014). Oil prices affect both the economy and financial performance of firms. Operating costs of manufacturing firms are affected by oil prices. Operating costs on the other hand directly impact the companies' profitability. Companies' profitability is not only a measure of financial performance but also cash flows which are discounted to determine the value of the firm (share price). Therefore, any adverse effect on profitability ultimately affects the firm share price (Arouri, 2011).

Financial performance is a segment of financial risk management that measures a firm's overall health in monetary terms. This measurement is based on a period of time; ‘for a period' or ‘at a particular period'. Financial statements are the basis on which financial performance is rooted. These financial statements include; statement of financial position, income statement, statement of cash flows and statement in changes in equity. The statement of financial position, income statement, and statement of cash flows are fundamental when it comes to a firm's financial performance. The process of examining and interpreting the financial statements is known as financial performance analysis. It involves a financial analyst and a firm's financial statements. Key areas where financial performance focuses on are; working capital analysis, financial structure analysis, activity analysis and profitability (Verma, 2017).

Financial performance measurement is important because it is the core of a firm's financial performance. After the financial measurement, the firm is compared with its past performance, its own set budgets, and its industry peers. By doing so, investors, managers, employees and other stakeholders are able to make an informed decision in regards to the firm financial performance. Financial ratios are significant when it comes to the measurement of

financial performance. The financial ratios are categorized into profitability, liquidity, efficiency, risk and solvency ratios. Profitability ratios aim at determining whether the firm is doing well in terms of its profits. Some profitability ratios include; return on assets, return on equity, profit to expenses ratio, net profit margin, and gross profit margin. Liquidity aims at finding out whether or not the firm has adequate cash to meet its current obligations. Some of the liquidity ratios include; quick ratio, acid test ratio, current ratio, working capital ratio. Efficiency aims at finding whether or not a firm is utilizing its resources well (assets) to generate income. Some of the efficiency ratios include; accounts receivable turnover, asset turnover, inventory turnover and days' sales inventory. Risk and solvency aim at finding whether or not a firm is capable of paying its debts or is at risk of defaulting. Risk and solvency ratios include; debt ratio, equity ratio and debt to equity ratio (Abdi, 2010).

Financial performance is a significant aspect when it comes to sharing price purchases. According to Menaje (2012), ROE and EPS which are components of financial performance have a major influence on share prices. In fact, in his findings, 75% variations in share prices are explained by these two components. In addition to this, rational investors make informed decisions after carrying out the financial performance of various firms. Therefore, this is evident that financial performance is critical when it comes to equity market (Shamsudin & Mahmood, 2013).

Shares represent the ownership an investor has in the company. A share price is a price of a single ownership of a company’s stock (Menaje, 2012). Shares can either be a common stock or a preferred share. Common stockholders are those that are all the risks of owning the company in case of insolvency. Preferred stockholders are those that are paid off first before the common stockholders in case of insolvency. Shares can also be for a private or public company. The share

price of a public listed company is publicly traded. These shares are traded in the securities exchange under the equity market. The aim of investing in stocks is to make returns. These returns are either in a form of capital gain or dividends (Ni, 2006).

In Kenya for instance, shares are traded at the Nairobi Securities Exchange. At the NSE, shares of listed companies are put in different segments and displayed together with their share prices. The prices keep on changing due to various reasons among them is the demand and supply, market information regarding the firm like profit increase announcement (NSE, 2013). Share prices reflect the overall performance of a firm (Shamsudin et al. 2013). Analysts, rational investors and even managers looking for investment opportunities in the equity market base their judgment on financial performance. In case a firm is affected by high costs that eat on its revenues, have efficiency issues or have solvency risks, it will all be reflected by the decline of share prices. Good earnings exhibited by a firm attract investors and this is reflected by an increase in the firm's share price (Menaje, 2012).

According to Gill et al. (2014), firms' earnings are affected by operating efficiency. Operating efficiency comprises of cash conversion cycle, operating expenses to sales revenue ratio, operating cash flows, total asset turnover, total debt to total assets ratio, firm size and operating risk impact on future firm' performance. They found out evidence that operating expenses impact on the future performance of firms. Oil prices are a significant cost when it comes to manufacturing companies and which means that it contributes substantially to operating expenses which impacts the financial performance of the firm. Increase in operating costs adversely affects the cash flows of the firm. This adverse effect is reflected in the share prices through equity pricing. Since oil prices are a major input in manufacturing firms, its price increase will push the operating expenses up which adversely affects a firm's cash flows. This

negative effect on cash flow will be reflected in the share prices of the firms (Onuonga et al. 2011).

1.2 Problem Statement

According to IEA (2015), the manufacturing sector is one of the sectors that are crucial to realizing Kenya's vision 2030. Energy wise, it is the first consumer of electricity and second in petroleum after the transport industry. Despite playing a key role in the economy, it is highly affected by the volatile nature of oil prices. Among other variables, oil is an important component of business costs. The huge reliance on oil by manufacturing firms in its processes makes their financial performance susceptible to oil prices volatility (Kojima, 2009; Onuonga et al. 2011).

The effect of oil prices on the financial performance of firms has roused interest in researchers. Efforts have been dedicated to understanding the relationship between the financial performance of industries and the oil prices. However, these efforts have not satisfactorily come up with explanations that explain the effect of oil prices on stock prices of manufacturing firms.

Sardosky (2001); Elyasiani & Mansur (2011); Hassan & Ratti (2012); Gatuhi & Macharia (2013); Narayan & Gupta (2015) are some of the authors who have tried to fill this gap by examining the effect of oil prices on financial performance of firms by focusing on stock returns. Sardosky (2001); Elyasiani & Mansur (2011) examined how oil prices affect the stock markets in Canada and G-7 countries. Hassan & Ratti (2012) determined how oil prices affect oil sector financial performance in Australia. Narayan & Gupta (2015) determined how oil prices predict share prices in the United States. In Kenya, most researches have focused on the relationship between oil prices and macroeconomic variables. Kiptui (2009); Ramos & Ng'ang'a (2013);

Mureithi (2015); Maina (2015) looked at the relationship between oil prices and macroeconomic variables. Kiptui (2009) found out how oil prices affect inflation in Kenya, Ramos & Ng'ang'a (2013) examined how foreign exchange affects oil prices in Kenya, Maina (2015); Mureithi (2015) examined how oil prices affect macroeconomic variables; GDP, interest rates and foreign exchange. Despite these great efforts, the effect of oil prices on share prices in Kenya still remains a grey area.

Gatuhi & Macharia (2013); Mwangi (2015); Bett (2016) are some of the researchers who have shade light on how oil prices affect share prices. Looking at these studies, it is evident that very few are from Kenya. In addition, these studies focus on crude oil and the stock market as a whole, obviating the intervening factors that distinguish crude oil prices from the actual oil products consumed and their actual prices.

Therefore, this study will contribute to the extant literature by not only looking at the relationship between crude oil prices but also incorporate diesel and liquefied petroleum gas and the share prices of listed manufacturing companies in Kenya.

1.3 Research Objectives

1.3.1 General Objective

To evaluate the relationship between oil prices and share prices of listed manufacturing firms in Kenya.

1.3.2 Specific Objectives

1. To evaluate the relationship between crude oil prices and share prices of listed manufacturing firms in Kenya

2. To evaluate the relationship between diesel prices and share prices of listed manufacturing firms in Kenya
3. To evaluate the relationship between liquefied petroleum gas prices and share prices of listed manufacturing firms in Kenya

1.4 Research Questions:

1. What is the relationship between crude oil prices and share prices of listed manufacturing firms in Kenya?
2. What is the relationship between diesel prices and share prices of listed manufacturing firms in Kenya?
3. What is the relationship between liquefied petroleum gas prices and share prices of listed manufacturing firms in Kenya?

1.5 Significance of the Study

1.5.1 Policymakers:

Since manufacturing firms contribute significantly to the growth of the economy, the study findings will be helpful to the policymakers to come up with policies that will create a win-win situation for both the oil industry and manufacturing industry through logical pricing of petroleum products.

1.5.2 Manufacturing firms and Investors:

Manufacturing firms, on the other hand, will be able to understand what magnitude petroleum prices impact their cash flows and they will be able to devise mechanisms that will help them reduce or curb oil price fluctuations. In doing so, manufacturing firms will be able to

safeguard and maintain a stable cash flow streamline and this will be reflected in the share price ultimately.

For investors, they will be able to know how oil prices affect manufacturing share prices. By so knowing, they will be able to make wise decisions when it comes to buying, selling and holding their investments in the manufacturing sector.

1.5.3 Scholars:

Since the study aims at contributing to the extant literature on the relationship between oil prices and share prices, scholars will be able to gain more in-depth information on this relationship and they will be able to expand their knowledge and in case of research, it will help them respectively.

1.6 Scope of the Study

This study focused on the oil products prices; diesel and LPG and how they affect share prices of the listed manufacturing firms in Kenya. The study period was between months 1 (September) of the year 2013 to month 48 (September) of the year 2017.

1.7 Justification of the Study

Kenya Petroleum Refinery Limited (KPRL) operations were shut down in 2013 because it could no longer sustain itself. This led to the importation of already refined oil products namely diesel, gasoline kerosene and other crude oil products. This importation started in September 2013 to date (ERC, 2014). During that period, oil prices have been fluctuating too. For instance, in 2015-2016, there was a drop in oil prices (EIA, 2018). In this respect, this study has looked at these periods to determine the relationship between oil prices and share prices.

Diesel, gasoline, kerosene, and L.P.G are some of the refined oil products sold and consumed in the Kenyan market. Reason for settling on diesel and L.P.G is that they are mostly used by manufacturing firms for energy provision and vehicular purposes (Akinyi, 2006; Onuonga et al. 2011).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section provides evidence on how oil price fluctuations affect stock prices. It first looks at how oil prices affect the economy and firms' production processes through its transmission mechanism. As the firm's production process is affected, cash flows are ultimately affected and this leads to a change in stock prices. To further elaborate how cash flows are affected, equity pricing theory becomes an important aspect of this work as it explains how variation in cash flows leads to change in share prices. In addition, this section also examines empirical evidence that has been built over time on the relationship between oil prices and stock returns in the world and in Kenya as well.

2.2 Theoretical Review

This study looks at three important theoretical frameworks which are oil transmission mechanism, equity pricing theory, and the efficient market hypothesis.

2.2.1 Oil Transmission Mechanism Theory

A transmission mechanism is a way or a channel in which the economy is affected by certain variables. According to Guiningundo (2008), the transmission mechanism of monetary policy is the channel in which an economy is affected by monetary policies. He found out that exchange rate, interest rate and even allocation of credit are some of the ways or channels in which Philippine's economy is affected. On the other hand, the oil transmission mechanism is the way or channel through which oil prices affect the economy. According to Maina (2015), oil

prices affect the economy through two channels. These are demand channel or supply channel as discussed below.

The increase in oil prices is detrimental to the economic activities. A theoretical model was developed after examining and analyzing the effect of oil prices of the 1970s on output and inflation (a case of UK manufacturing firms). It was found out that high oil prices which are an important input in production play a significant role in the slowdown of output throughout the manufacturing firms in the UK (Bruno & Sachs, 1982). Hamilton (1973) confirmed that there is a negative relationship between oil prices and macroeconomic activities. Berument, Ceylan, & Dogan (2009); Ebrahim, Inderwildi, & King (2014) assert that when oil prices increase, the cost of production follows suit and eventually output reduces.

The magnitude of the decrease in output depends on the aggregate demand curve. Higher oil price lowers disposable income and this leads to a decrease in consumption. When oil price increases and is perceived to be permanent, private investment also reduces. How does output reduce due to the increase in oil prices? Oil is used in lesser proportions in production than when the price is low. In the case of persistence in the increase in oil prices, the following will be adversely affected; capital will fall, labor productivity and potential output will also fall. For oil importing countries, however, oil consumption is difficult to decrease in the short run. When oil prices increase, the inelastic demand curve for oil means total spending on oil imports increases. The resultant effect is that pressure is put on the foreign exchange rate and local currency depreciates. The local currency depreciation adversely affects the economic performance by making imports more expensive (Berument et al. 2009).

In the short term and medium term, economic performance is affected by the hike in oil prices. In the short term, economic impacts largely reflect the deterioration of aggregate demand

as oil price volatility persists. Due to the economic uncertainty created by oil price volatility, aggregate consumption and investment also decrease immensely. In addition to this, industrial production also decreases. Reduction in production comes about because most producers would like to maintain the margin they were making. Therefore, they will add some premium to cover up the rise in the cost of production due to a rise in oil prices. This will ultimately reduce demand because consumers will shy away from the increased prices by the producers. In the medium term, aggregate supply is more responsive to oil price volatility than aggregate demand. The decrease in investments in the short term will lead to constrained production capacity and increased supply inelasticity. Inflation is also witnessed in the midterm due to less supply as a result of low production capacity caused by an increase in oil prices (Ebrahim et al. 2014).

Ebrahim et al. (2014) findings on inflation is in agreement with Bhattacharya & Bhattacharya (2001); Leblanc & Chinn (2004), Gregario, Landerretche, Neilson, Broda & Rigobon, (2007); Kiptui (2009); Hasanat, Jun, Li & Hasan (2013) research on increase in oil prices raises firms cost and this leads to increase in prices they charge their goods. Holding non-energy prices constant, this raises inflation.

According to Ebrahim et al. (2014), oil price volatility affects three primary macroeconomic channels directly. Extend in which these channels are affected depend on the uncertainty created by oil price volatility and the attitudes of the economic agents. These three macroeconomic channels discussed below are; consumption, investment and industrial production.

How is consumption affected by oil price volatility? Oil price volatility causes uncertainty in future income and employment prospects. This is so because consumers are not sure of how oil prices are going to be and this makes them pessimistic about the future. Once

their confidence is thwarted, they are prompt to adopt precautionary savings behavior at the opportunity cost of current consumption. By reducing the propensity to consume, greater economic uncertainty manifests in decline aggregate consumption.

How is investment affected by oil price volatility? Most investments rely on consumption; most investments are responsive in areas where consumer demand is resilient or expected to grow. When oil price volatility affects consumption negatively, it is true to deduce that investments are affected likewise. The literature on real options asserts that, since there are uncertainties in regards to profitability of investment in volatile energy environment, the benefits of holding risk-averse investment outweigh the prospects pros gained from the current commitment.

Industrial production affected by oil price volatility on two fronts. The first front is on the side of consumers and the other is from the side of costs affecting the producers in terms of delivery and other costs as a result of oil price volatility. When oil prices increase, producers raise prices of their products so as to maintain their level of production and the margin they used to make. As a result, consumers reduce their consumption due to high prices of goods. This reduction in consumption then forces producers to reduce their production capacity. On the other side of the coin, when oil prices increase, employees will also require higher pay to cushion their consumption. Transportation cost will also go up and eventually affect the distribution costs of the producers and this pressure will lead to most producers reducing their capacity.

Petroleum products for the Kenyan markets are procured through an Open Tender System which is a competitive bidding process. 30-45 days is the period between an award of tender and delivery of the product. As a result of this lag, consumers do not immediately enjoy benefits of reduced prices whenever they occur in international markets. For example, the current fuel pump

prices are tagged on the Cargoes procured almost two months ago. Supposing there is a decline in the international oil prices today, this will be reflected almost two months from today. The ERC determines and publishes retail oil prices of super petrol, diesel, and kerosene using a formula that takes into account the cost of refined petroleum products and other costs along the supply chain. These other costs include taxes and levies, freight costs, insurance, port handling charges, storage, distribution costs and a margin to oil marketing companies. The cost of imported products accounts for 60% of the pump prices and this proportion is the one that changes with international prices (ERC).

From Kenyan perspective oil price volatility is high and this is evident from the procurement bit, the time lag prices take to reflect in the market and the additions such as taxes and retailers profits to the price of oil (ERC). The question that follows therefore is, do oil prices have a transmission effect in Kenya's economy? The answer is a definite yes. After examining how oil prices affect macroeconomic variables, Gachara (2015) concluded that oil prices have a significant effect on macroeconomic variables in Kenya which is similar to findings in other import countries. In particular, he found out a negative relationship between oil price volatility and economic growth. According to Osoro et al. (2014), the financial performance of a firm relies on the economic conditions of the country. Since oil prices affect the economic conditions of the country (Kenya), it, in fact, affects the performance of oil-intensive firms in Kenya. These oil intensive firms include manufacturing firms which are highly affected by oil prices (Onuonga et al. 2011).

2.2.2 Equity Pricing Theory

According to Harvey (2001), asset pricing theory is a framework in which identification and measurement of risk are done and assignment of rewards to those bearing risks. It is based on a number of premises. These premises are; investors are risk averse and that they like higher expected returns. In addition, an investor holds a diversified portfolio. In corporations, asset pricing theory is important because it helps in choosing projects. It assigns discount rates to the projects which are then compared with their returns. The higher the return as compared to the project's cost of capital (discount rate), the better the project. Equity pricing theory, on the other hand, is a subset of asset pricing theory and is based on equity valuation. Equity valuation is the process of finding fair value of the stock. It takes into account future stream of cash flows, in this case, dividends which are then discounted by a particular rate to get the present value of the stock which is its fair value (management study guide).

Huang et al. (1996) expressed clearly how oil prices affect stock returns. Stock returns by definition are simply the discounted values of expected future cash flows expressed as follows:

$$P = \frac{E(C)}{E(R)}$$

Where p represents the stock price, c represents the cash flow stream, r represents the discounted rate and E represents the expectation operator.

Future oil prices can affect stock returns in two ways. These are through cash flows and discounting rate. Firstly, oil is a significant resource especially for companies that use it in the production process as input (oil consuming companies). When oil prices go up, the resultant effect will be a rise in the cost of production and this will ultimately cut down the cash flows attributable to the company hence a reduction in stock returns. Secondly, a discount rate is

composed of the expected inflation rate and real interest rate which are dependent on oil prices. In an oil import economy, for instance, an increase in oil prices will cause currency depreciation which will result in upward pressure on the expected inflation rate. The high inflation rate is positively related to the discount rate and this will adversely affect stock returns. Corporate investments usually have hurdle rates (cost of capital). This hurdle rates can be affected by an interest rate. Oil is an integral resource in an economy. Therefore, when its price increases relative to the general level, can cause a rise in real interest rate causing an increase in the hurdle rate which will ultimately lead to a decline in stock prices (Huang et al. 1996).

According to Arouri et al. (2011), financial markets are more efficient than real markets (other markets). Since financial markets are more efficient, it becomes highly sensitive to new information. In a case of new information as a result of oil prices, it will be absorbed quickly by stock markets and stock prices will reflect this information. Since stock prices are equal to discounted cash flows, changes in economic conditions like inflation, interest rates, production costs, income, demand and economic growth, investor and consumer confidence will be reflected instantaneously on the discounted cash flows which are stock prices. These sentiments are in agreement with Huang et al. (1996) about changes in economic conditions affecting the discounted cash flows. Since there is an asymmetric relationship between oil prices and macroeconomic variables, it is also true to say that the same relationship exists between oil prices and stock returns. Asymmetric relationship means that an increase in oil price has a more significant adverse impact on macroeconomic variables than a decline in oil prices. Further, it is important to note that the relationship between oil prices and stock returns differ in various industries. The oil-intensive industries tend to be more affected by oil prices than less oil-intensive industries.

The value of stock equals the discounted sum of expected future cash flows. These cash flows are affected by macroeconomic variables that may be influenced by oil price changes. Theoretically, on the supply side, oil price volatility may have a negative influence on the basic production (input availability and investment costs). On the demand side, oil price volatility may affect a firm's production structure hence creating unemployment. On the monetary policy side, interest rates and the inflation rate will be affected by oil price volatility. Lastly, consumption will also be adversely affected by oil price volatility because of high production cost which leads to an increase in product prices hence reduces consumer demand and sentiment (Arouri et al. 2011).

2.2.3 Efficient Market Hypothesis Theory:

The relevance of EMH is still debatable to date. While some authors argue for, others argue against. The concept of market efficiency was first coined by Fama in 1965. This theory states that share prices reflect all the information and that investors cannot earn more returns than the market rate (Degutis & Novikyte, 2014).

According to Jandik & Mandleker (2000); Degutis & Novickyte (2014), this theory looks at market efficiency in three fronts. They include Weak Market hypothesis which state that share prices reflect past information only, a semi-strong market hypothesis which state that share prices reflect past and all current information and strong market hypothesis which state that share prices reflect all information. However, this study focused on one particular market hypothesis and that is a semi-strong market hypothesis because it has a direct relationship with the study.

Semi-strong market efficiency state that share prices reflect past and all current information. Past information includes income statements, filings with securities exchange

commission and annual reports. On the other hand, the current information includes; dividend payout announcement, merger or acquisition plans announcements, information on competitors' situation and state of macroeconomic variables such as interest rates, foreign exchange, inflation and even unemployment rate. Processing this information takes time and effort. To be able to comprehend such kind of information requires not only a financial analyst but someone who possess an in-depth understanding of macroeconomic variables and how it impacts share prices (Jandik & Mandleker, 2000; Degutis & Novickyte, 2014). Looking at the objectives of the study, retail oil prices; I.D.O, L.P.G, diesel, and gasoline are past and current information which might affect share prices of oil-intensive firms. Therefore, semi-strong market hypothesis theory is relevant to this study.

2.3 Empirical Review

This section examines the evidence in regards to oil prices and share prices. It expands more on the specific objectives of the study and it is divided into three parts. These parts are; the relationship between diesel oil prices and the share prices, the relationship between liquefied petroleum gas and the share prices and lastly the studies that have been done in Kenya in regards to oil prices and share prices.

2.3.1 The Relationship between Crude Oil prices and Share prices

Jones & Kaul (1996) examined how oil prices affect output and real stock returns in the United States, the United Kingdom, Canada, and Japan. They found out that increases in oil prices have a negative impact on the output and stock returns in United States, Canada, Japan and the United Kingdom during the post-war period. In addition, they found out that the United

States and Canada's stock market are rational to new information, unlike Japanese and United Kingdom's markets.

Sardosky (1999) used the VAR model and found out that oil prices have asymmetric effect on the economy in Canada; the rise in oil price has a greater impact on the economy than its decline. He asserted that when there is an increase in oil prices, it depresses real stock returns. Real stock returns, on the other hand, have a positive impact on interest rates and industrial production. Therefore, when stock prices are depressed due to high oil prices, they will adversely affect interest rates and industrial production which are some of the key components of the economy.

Kilian & Park (2007) used the VAR model to assess the impact of oil prices on stock returns in the United States and Canadian stock market. They posited that the impact of oil prices on stock prices depends on which shocks that cause oil price fluctuations; demand or supply shocks in the crude oil market. For instance, in a case of an anticipation of a future shortfall in oil supply, there will be a precautionary demand for crude oil and this will spur an increase in prices causing lower stock returns. In a case of a positive shock that occur due to global demand for industrial commodities, stock prices will increase. This explains the unique resilience of the United States stock market. They concluded that oil demand and oil supply shock combined together account for 22% of the long-run variation in United States real stock returns.

Elyasiani & Mansur (2011) examined how oil prices affect stock returns in the G-7 and Norway. They used the VAR model and data from the period of 1986 month one to 2010 month twelve. Other exogenous factors they used apart from oil prices were interest rates and industrial production. They found out little evidence of an impact of a linear oil price shock on real stock returns of the G-7 and Norway. France, Germany, and Norway were the only countries that

yielded a statistically significant impact on the real stock returns in the same month or within one month when oil price was measured by real-world oil price. However, less significance was obtained when measured by national oil prices. Asymmetric oil price shocks on real stock return variance decomposition indicated that oil price has a powerful impact on the net importing countries and Norway. It implies that a decline in oil prices have a more powerful effect on stock returns in Canada and Japan. Similar findings were also obtained in Janor, Abdul-Rahman, Houseseinidoust & Abdul-Rahim (2013) after examining how Malaysia securities exchange is affected by oil price volatility. According to Janor, Abdul-Rahman, Houseseinidoust & Abdul-Rahim (2013) oil price shocks affect stock return as a whole. They found out that this shock affects stock returns asymmetrically; negative shocks intensify volatility of the Kuala Lumpur Composite Index.

Huang et al. (1996) disagreed with other researchers on the conclusion that oil prices affect market performance. They used the VAR approach to examine the lead-lag relation between oil futures returns and stock returns, and oil futures volatility and stock returns. They concluded that oil futures volatility does not influence entire stock returns other than the stocks of oil companies.

Sardosky (2001) looked at the risk factors in stock returns of oil and gas companies stocks in Canada. He used a multifactor model to find out how oil prices, exchange rate, and market return affect oil and gas companies stocks. He found out that an increase in oil prices led to an increase in stock returns.

Boyer & Filion (2004) examined how the stocks of Canadian oil and gas companies are affected by various factors. They used a multifactor model to analyze their results similar to Sardosky (2001). They found out that crude oil prices positively and significantly affect the stock

prices of oil companies. To their surprise, foreign exchange negatively affected the stock returns of oil and gas companies. It was a surprise because Canada is an oil and gas export country. The reason for this, however, was justified due to the equipment and machinery imported for the production and processing of oil and gas and hence the negative relationship between foreign exchange and oil and gas companies. El-Shariff et al. (2005) also used a multifactor model to analyze the relationship between oil prices volatility and oil and gas stocks performance in the United Kingdom and found out similar results as Sardosky (2001).

Pirong (2012) examined the financial performance of the major oil companies in the United States from the periods between 2007 and 2011. Some of the oil companies he examined were; Exxon Mobil, BP Plc, Royal Dutch Shell Plc, Chevron and Conoco Philips. All the firms analyzed both engaged in upstream and downstream oil activities. He found out that, despite the negative effect oil prices have on the economy, it is not the case with oil companies' financial performance. Increase in oil prices leads to an increase in revenues and ultimately increase in profits of the oil companies.

Hassan & Ratti (2012), assert that oil price volatility influence stock prices through affecting expected cash flows. Due to the fact that oil is used as an input in production, it can influence the demand for output at both industry and national levels through affecting the cost of production especially when prices go up. Eventually, the cost of production will push the price of goods up and this will lead to inflation. Once inflation is affected, the expected real interest rate will be affected too which will adversely affect the discounted rate hence affecting cash flows. They used a GARCH model to determine how oil price volatility affects the Australian sector stock market. The sectors analyzed included, energy, material, financial, IT and utility. They found out that returns in the industry sector fall with an increase in oil price volatility. Further,

they found out that increase oil price return volatility significantly reduces stock return volatility for energy, materials, industrials, I.T, and utilities but significantly increases volatility stock return volatility for the financial sector. Overall stock market index declines when oil price return increases. The work of Dhaoui et al. (2014); Cueppers & Smeets (2015) agree with the above conclusions since they got similar results; oil companies share prices are significantly and positively affected by oil prices.

Wattanatorn & Kanchanapoom (2012) examined the relationship between oil prices and financial performance (profits) of 11 different sectors in Thailand. Thailand is a developing country and an oil importing country. They gathered a consolidated report from Stock Exchange of Thailand (SET) during the period of 2006 and 2010. They used ROA in measuring profits of the selected firms in various sectors. The data they used was obtained from SET Market Analysis and Reporting Tool (SETSMART) web-based application that provides integrated comprehensive sources of Thailand listed companies' data. Since their data was a panel data, the used GLS and to deal with the problem of endogeneity, fixed and random effects estimation method were used. They found out that oil prices positively and significantly influence the profits of energy and sectors for random effect model. Their findings were similar to Dayanandan and Donker (2011) findings.

2.3.2 The Relationship between Diesel prices and Share prices

Diesel is one of the refined products of crude oil (OPEC, 2015). Very little is known about the relationship between diesel prices and share prices. Nevertheless, the following researchers have tried to fill this gap. Gatuhi & Macharia (2013) concur that oil prices have an effect on stock prices. They examined how diesel prices, interest rates, foreign exchange and

market returns affect stock prices. They found out that diesel prices positively and significantly influence the performance of Nairobi Securities Exchange. Interest Rate, on the other hand, had a negative influence on the performance of the securities exchange. Further findings showed that the combination of exchange rates and diesel prices, positively influenced the performance of the securities exchange but the influence was not significant.

Onuonga et al. (2008) looked at how energy affects manufacturing firms. In their work, they assert that apart from electricity, manufacturing firms heavily rely on industrial diesel oil and heavy fuel oil in their thermal energy requirements. Further, they looked at their price elasticity and they found out that the prices of energy; oil and electricity are inelastic. When the price of oil increases the demand for oil slightly reduce. This means that, when there is an increase in oil prices, the demand for oil reduces slightly since there are few alternative sources of energy for manufacturing firms. They concluded that due to the price inelasticity of oil prices, cost of production of manufacturing firms is adversely affected and this ultimately affects their financial performance.

According to Kojima (2009), one of the main reasons for an increase in oil prices in 2008 to 2009 in Kenya was due to increased demand for diesel by electricity companies. Number one consumers of electricity in Kenya are manufacturing firms. Hydropower is the main source of electricity in Kenya. When the water levels go down due to drought, alternative sources are used to generate electricity. The main alternatives source to hydropower is diesel powered generators. In 2000 for instance, there was drought and the oil importation increased mainly due to heavy reliance on powered diesel generators for electricity provision (Mureithi, 2013).

2.3.3 The Relationship Between LPG and Manufacturing Firms

There is no study that discusses the relationship between LPG prices and share prices. However, there are a few kinds of research that have looked at the demand of LPG. In Kenya for instance, Akinyi (2006) asserts that LPG is consumed heavily by the manufacturing sector especially the ones involved in making ceramics.

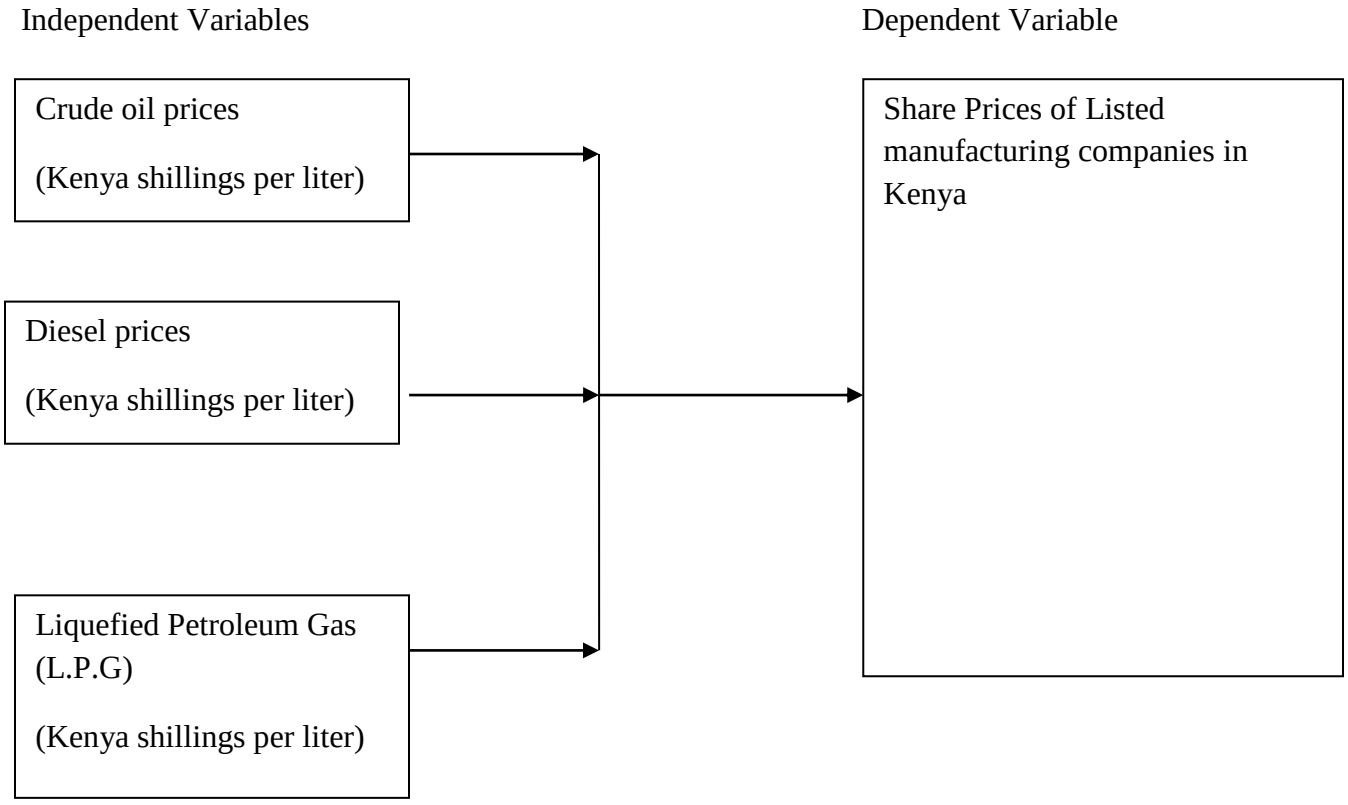
Ceramics are made of clay. To make them dry, hard and solid requires a lot of heat. LPG is known for its clean combustion which is required for this process (drying of clay to make them hard and solid). LPG is also cheap and this helps the manufacturing industries to cut down on costs and increase productivity. Manufacturers who deal with food processing require heat. Manufacturers that are involved in baking, making biscuits, chips, and chocolate avoid the risk of contamination by using LPG. Slaughterhouses use LPG for cleaning and sterilization and dairy firms use LPG for pasteurization. Metal processing is another manufacturing industry that requires a lot of heat and LPG comes in handy. LPG is used to melt the metals into the alloy and also assist in paint drying and galvanization. Textiles industry is another manufacturer that uses LPG in its processes. Last but not least are manufacturers who are involved in printing. LPG is used to fasten the drying process in printing. Since manufacturers use forklifts to move heavy cargo around, the use of LPG cannot be ruled out because forklifts are powered by LPG (Total South Africa).

Despite the fact that there are a lot of studies in Kenya that focus on oil prices, very few have focused on the relationship between oil prices and stock market or stock return of a particular sector. Some of the researchers who have shade light on the relationship between oil prices and stock returns in Kenya include; Gatuhi & Macharia (2013); Mwangi (2015); Bett (2016).

Mwangi (2015) used Johansen co-integration and VECM to model the impact of oil prices on stock prices in Kenya. He found out that in the short run, oil prices have a significant influence on stock prices in Kenya. Similarly, in the long run, oil prices still have a significant influence on the stock prices. He further found out that the negative influence of stock returns is caused by oil prices. Impulse response results showed that oil shocks cause a sudden decline in stock prices. This is supported by the fact that the cumulative effects of oil price shocks account for 9.02% of the variation in stock prices in the long run.

Bett (2016) used VAR Model to evaluate the relationship between oil prices and share prices of manufacturing firms listed on the Nairobi Securities Exchange. He found out that there is a long-term relationship between oil prices and share prices. Also in his findings, oil price movements granger cause the share prices of listed manufacturing firms in Kenya.

2.4 Conceptual Framework



From the conceptual framework above, share prices of the listed manufacturing firms is the dependent variable measured in Kenya shillings per liter. Crude oil prices, diesel prices and liquefied petroleum gas are the independent variables which affect the share prices. Based on the study main objective, crude oil prices, diesel and LPG were analyzed together with the share prices to find how they relate and the effect of the oil prices on the share prices.

2.5 Operationalization of Variables:

VARIABLES	TIME PERIOD	MEASUREMENT
DEPENDENT VARIABLE:		
Share Prices of 8 listed manufacturing companies in Kenya	Month 1 September 2013 to month 48 September 2017	Kenya shillings per share price per month
INDEPENDENT VARIABLES**:**		
Crude oil prices	Month 1 September 2013 to month 48 September 2017	Kenya shillings per liter per month
Diesel prices	Month 1 September 2013 to month 48 September 2017	Kenya shillings per liter per month
Liquefied Petroleum Gas	Month 1 September 2013 to month 48 September 2017	Kenya shillings per liter per month

2.6 Research Gap:

Despite manufacturing firms being second in oil consumption after the transport industry, very few studies have looked at how oil prices affect the financial performance of manufacturing firms. This study, therefore, has tried to fill the gap by looking at how two oil products; diesel and L.P.G which are mostly used by manufacturing firms in its processes and for vehicular purposes affect the share prices index of the manufacturing firms in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3. Introduction

This chapter discusses the research design of the study, target population, data collection and how data was analyzed.

3.1 Research Design

A research design is a strategy or a map that outlines how a research problem should be tackled. It has evolved over time and especially with the advancement of technology (Creswell, 2014). There are several research designs but this study will only focus on one. This study used a descriptive design to answer the research questions.

The descriptive design is a design that explains a particular situation or phenomenon under study. It also explains what is going on. In descriptive design, a researcher has no control of the variables. However, what is observed is reported objectively. It also employs the use of quantitative techniques (AECT, 2001). This study fits descriptive design because it describes how oil prices fluctuation in Kenya affects share prices of listed manufacturing companies in Kenya. Also, it has employed the use of quantitative techniques to get the findings which explains the relationship between oil prices and share prices.

3.2 Target Population

Target population for a survey is whereby a whole set of units are taken under consideration and this are used to make inferences (Lavrakas, 2008) .The target populations were the listed manufacturing firms at the NSE in Kenya under manufacturing and allied category.

The study focused on eight firms that were listed since the year 2013 to 2017. The eight manufacturing firms are listed under appendix 1.

3.3 Sample Size

A sample size is the number of units that are taken for study from a large pool of units. The sample size is normally considered a representative of the large pool of units (Lavrakas, 2008). A sample of 8 listed manufacturing firms was used in the study out of 10 that are currently listed at the NSE. Reason for this is that given the period of the study (September 2013-September 2017), one of the manufacturing firms had not yet been listed and one got delisted hence excluding the two from the study.

3.4 Data Collection

This study used monthly secondary data from the period of month 1: September 2013 to month 48 September 2017. These secondary data are share prices of listed manufacturing companies in Kenya, crude oil prices; L.P.G prices and diesel prices. These prices were all in Kenya Shillings. The monthly share prices of the listed manufacturing firms were obtained from the Nairobi Securities Exchange from the period of 2013 to 2017. Oil prices were obtained from E.I.A website that offers international oil prices. The monthly data was used because of the following reasons. Oil prices are reviewed on a monthly basis (ERC). Monthly data has higher frequency unlike quarterly data and daily data. Quarterly data has a lower frequency because of its smoothing effect which wipes out any meaningful results. Daily data on the other hand brings with it the complexity of weekends and public holidays (Sardosky 1999; Park & Ratti, 2007). Since, the study focused on the eight listed manufacturing firms at the NSE then the best tool for data collection was census (Appendix 1).

3.5 Data Analysis

Multivariate time series regression analysis was used to analyze the data. Multivariate time series is a series of more than one independent variable. To make the Y variable; share prices of 8 listed manufacturing firms to best suit as time series data, an index was developed. Using excel monthly averages for the eight listed manufacturing companies were obtained and this was treated as the index for the 8 listed manufacturing companies in Kenya. Since, the main objective of the study was to find out the relationship between oil prices products and the share prices of listed manufacturing firms in Kenya, VAR model was used to find out the relationship between oil prices and the share prices of the listed manufacturing firms in Kenya. After obtaining the required data, STATA software was used to analyze data. Several diagnostic tests were carried out during the analysis stage before settling on the model that best fits the study.

3.6 Time Series Diagnostic Tests:

The time series diagnostic tests are tests carried out to establish whether the variables are fit to generate an acceptable model (Kuan, 2011). Time series have unique diagnostic tests and steps followed for analysis. Several time series tests are listed and discussed on the following paragraphs.

Unit root test: The study utilized ADF to find out if the variables were stationary or not. The ADF tests whether a series have a unit root or not. Unit root means that the series is not stationary. To determine whether the series were stationary or not was based on choosing either null or alternative hypothesis. Null hypothesis states that the series is not stationary while alternative states that the series is stationary. What influenced the decision was the Mackinnon's

P value. When the P value is greater than 5% level of significance, then the null hypothesis is accepted. When the P value is lower, then the null hypothesis is rejected (Mwangi, 2015).

Lag Selection: There are several lag selection criterion methods. The lags are important in the subsequent tests like co-integration tests and generating of VAR model. Among these methods, Swartz Bayesian Information Criterion (SBIC) is normally used since it is stricter than AIC alongside other lag selection criterion (Mwangi, 2015).

Co-integration test: Johansen test for co-integration developed by (Johansen & Juselius, 1990) was used to test whether the variables had a long-term equilibrium relationship. To determine whether variables were co-integrated, non-stationary series were tested to determine whether they move together in the long term. Maximum Eigen values and trace statistics were compared with the critical values to determine whether the series were co-integrated or not.

Granger causality test; it determines the direction of the relationship between the variables in the study (Granger, 1980). This study used this test to determine whether crude oil prices, diesel, LPG and share prices have causality among them. The P value was critical too in choosing between the null hypothesis that states there is no causality and alterative hypothesis that states there is causality.

Impulse Response Functions and Variance Decomposition; Impulse response functions are used to explain the dynamic effects of the shocks on the dependent variables. They trace the effects of shock from one dependent variable to another. Variance decomposition, on the other hand, separates the variation in a dependent variable into the component shock to the VAR (Sardosky, 1999). The study used both impulse response function and variance decomposition to

explain the impact of oil prices; crude oil, diesel and LPG on the share prices of the listed manufacturing firms in Kenya.

3.7 Study Model:

Model Summary:

Share Price = function (Crude oil_t,$Diesel_t$, $L.P.G_t$)

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

From the research model equation above,

B_0 is the constant

B_1, B_2 and B_3 are coefficients that explain the relationship between oil prices and the share prices.

Y is the share prices index of the listed manufacturing firms in Kenya.

X_1 is crude oil prices

X_2 is diesel oil prices and

X_3 is the LPG prices

Multivariate VAR model:

$$X_t = \alpha_0 + \beta_1 X_t + \beta_2 X_{t-2} + \ldots + \beta_q X_{t-k} + \mu_t$$

Compactly written model:

$$X_t = \alpha_0 + \beta_1 \sum_{j=1}^{k} X_t = j + \varepsilon_t$$

Where: X_t= is the 4 by 1-dimensional vector of endogenous variables of the model.

α_0= is 4 by 1-dimensional vector of constant

β_1= is a 4 by 4-dimensional autoregressive coefficient matrices of established parameter

ε_t= is a K dimensional vector of stochastic error term normally distributed with noise properties N (0,σ^2)

CHAPTER FOUR

DATA ANALYSIS AND INTERPRRETATION

FIGURE 4.1.1

Descriptive statistics results

	Percentiles	Smallest		
1%	9.02403	9.02403		
5%	10.10542	10.07481		
10%	10.41036	10.10542	Obs	48
25%	12.14443	10.19348	Sum of Wgt.	48
50%	15.70454		Mean	17.51801
		Largest	Std. Dev.	6.328242
75%	23.79584	26.94422		
90%	25.51464	28.9872	Variance	40.04664
95%	28.9872	31.73084	Skewness	.6578992
99%	32.82739	32.82739	Kurtosis	2.345023

DIESEL

	Percentiles	Smallest		
1%	26.4118	26.4118		
5%	30.64459	27.74223		
10%	33.14228	30.64459	Obs	48
25%	39.35353	31.76268	Sum of Wgt.	48
50%	44.16928		Mean	48.73468
		Largest	Std. Dev.	13.44496
75%	65.32205	69.24721		
90%	68.32819	69.26906	Variance	180.767
95%	69.26906	70.96057	Skewness	.4594507
99%	73.39709	73.39709	Kurtosis	1.895845

CRUDE

	Percentiles	Smallest		
1%	19.17698	19.17698		
5%	23.53098	19.88368		
10%	25.88094	23.53098	Obs	48
25%	29.4787	23.82071	Sum of Wgt.	48
50%	33.44243		Mean	38.24169
		Largest	Std. Dev.	12.56663
75%	54.6677	58.10065		
90%	57.38122	58.29878	Variance	157.9203
95%	58.29878	59.09157	Skewness	.603226
99%	59.73511	59.73511	Kurtosis	1.872567

SHARES

	Percentiles	Smallest		
1%	131.6662	131.6662		
5%	136.9642	132.5981		
10%	138.3324	136.9642	Obs	48
25%	157.3452	137.0184	Sum of Wgt.	48
50%	165.5279		Mean	164.3504
		Largest	Std. Dev.	16.59598
75%	170.4942	193.3113		
90%	191.4586	195.8031	Variance	275.4265
95%	195.8031	200.9116	Skewness	.0997369
99%	202.9827	202.9827	Kurtosis	3.204606

From the descriptive results in figure 4.1.1, show the details of the variables, number of observations, their mean, standard deviations, variance, skewness, kurtosis, their percentiles and the smallest and largest observations of the variables. There are four variables from the figure above; crude oil, diesel, LPG and share price index. The number of observations is 48 based on the months of the study.

Share prices index highest price is Kenya shillings 202 and the lowest price is Kenya 131. Its mean is Kenya shillings 164 per share. Share prices deviate from the mean at Kenya shillings 16.59 as represented by the standard deviation. The number of observations is 48.

Crude oil prices highest price is Kenya shillings 59.73 and the lowest price is Kenya shillings 19. Its mean is Kenya shillings 38.24 per liter. Share prices deviate from the mean at Kenya shillings 12.56 as represented by the standard deviation. The number of observations is 48.

Diesel prices highest price is Kenya shillings 73.39 and the lowest price is Kenya shillings 26.41. Its mean is Kenya shillings 48.73 per liter. Share prices deviate from the mean at Kenya shillings 13.44 as represented by the standard deviation. The number of observations is 48.

LPG prices have the lowest prices compared to other variables. The highest price is Kenya shillings 32.82 and the lowest price is Kenya shillings 9.02. Its mean is Kenya shillings 17.41 per liter. Share prices deviate from the mean at Kenya shillings 6.33 as represented by the standard deviation. The number of observations is 48. Since the variables are in time series, the following graphs will further aid in the description.

FIGURE 4.1.2

Crude Oil Prices Trend Graph

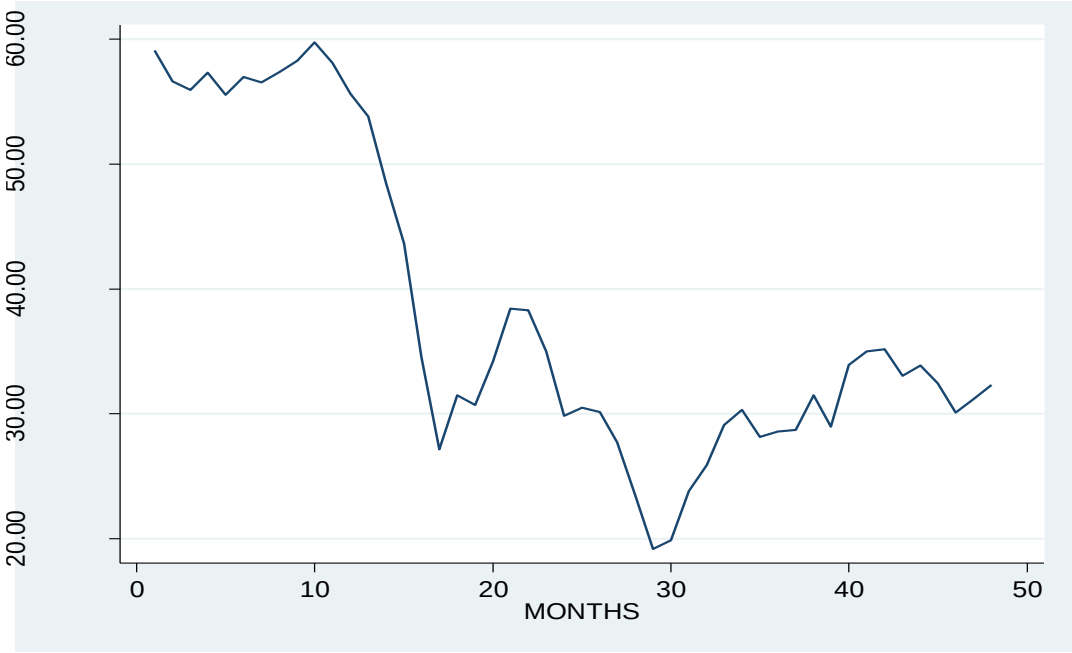


Figure 4.1.2 shows the trend of crude oil prices from month 1 2013- September to month 48 August 2017. From the graph, it is evident that crude oil prices have been fluctuating. At period 10, the price of crude oil was so high at Kshs. 60 per liter and towards period 20, it dropped below Kshs. 30 per liter. The prices rose up steadiy and again droped below Kshs. 20 per liter towards period 30.

FIGURE 4.1.3

Diesel Prices Trend Graph

Figure 4.1.3 shows the trend of diesel prices in Knya shillings from month 1 2013-September to month 48 August 2017. From the graph, it is evident that diesel prices have been fluctuating. At period 5 towards 10, the price of crude oil was so high above Kshs. 70 per liter and towards period 20, it dropped to Kshs. 40 per liter. The prices rose up steadiy and again droped below Kshs. 30 per liter towards period 30.

FIGURE 4.1.4

LPG Prices Trend Graph

Figure 4.1.4 shows the trend of LPG prices in Knya shillings from month 1 2013-September to month 48 August 2017. From the graph, it is evident that LPG prices have been fluctuating. At period month 5 towards 10, the price of LPG prices was so high above Kshs. 30 per liter and towards period 20, it dropped to Kshs. 40 per liter. The prices rose up steadiy and again droped below Kshs. 10 per liter towards period 30.

FIGURE 4.1.5

Share prices Trend Graph

Figure 4.1.5 shows the trend of share prices index of manufacturing firms in Kenya.The prices are in Knya shillings from month 1 2013- September to month 48 August 2017. From the graph, it is evident that the share index of manufacturing firms have been fluctuating. For instance, at period month 5 towards 10, the price of LPG prices was so low at Kshs. 120 and towards period 20, it rose to a high of Kshs. 200. The prices then dropped steadill and from month 25 onwards it has been flucuating Kshs. 160 and Kshs. 170.

4.2 Stationarity Test

All the series; crude oil, diesel, LPG and share prices were to undergo stationarity test as a first step of time series analysis.

FIGURE 4.2.1

Crude Oil Prices ADF Test Results

Augmented Dickey-Fuller test for unit root Number of obs = 46

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.622	-3.607	-2.941	-2.605

MacKinnon approximate p-value for Z(t) = 0.4714

D.CRUDE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
CRUDE						
L1.	-.0551649	.0340009	-1.62	0.112	-.1237342	.0134044
LD.	.3645987	.1378611	2.64	0.011	.0865752	.6426221
_cons	1.784668	1.358671	1.31	0.196	-.9553534	4.52469

From figure 4.2.1 above, crude oil prices series is not stationary. According to the null hypothesis null hypothesis, the series is not stationary while alternative hypothesis states that the series is stationary. To choose between the two, the Mackinnon P value is taken into consideration. When the P value is greater than 5% significance level the null hypothesis is accepted. When the P value is less than 5% significance level, the alternative hypothesis is accepted. From the ADF test above, crude oil series is not stationary because the Mackinnon's P value of 0.4714 is more than 0.05, significance level.

FIGURE 4.2.2

Diesel ADF Test Results

Augmented Dickey-Fuller test for unit root Number of obs = 46

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.482	-3.607	-2.941	-2.605

MacKinnon approximate p-value for Z(t) = 0.5425

D.DIESEL	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DIESEL						
L1.	-.0571323	.0385568	-1.48	0.146	-.1348895	.0206249
LD.	.1252118	.1488738	0.84	0.405	-.1750209	.4254444
_cons	2.336569	1.939503	1.20	0.235	-1.574811	6.247948

Diesel series is not stationary. From the ADF test exhibited by figure 4.2.2 above, the Mackinnon P value is 0.5425 greater than, 0.05 significance which leads to acceptance of null hypothesis that states the series is not stationary.

FIGURE 4.2.3

LPG ADF Test results

```
. dfuller LPG, regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        46

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -1.627            -3.607            -2.941            -2.605
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.4689

------------------------------------------------------------------------------
       D.LPG |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         LPG |
         L1. |  -.0865057   .0531597    -1.63   0.111    -.1937124     .020701
         LD. |   .1406011   .1510604     0.93   0.357    -.1640413    .4452435
             |
       _cons |   1.409072   .9799505     1.44   0.158    -.5671865    3.385331
------------------------------------------------------------------------------
```

LPG series is not stationary. From the ADF test exhibited by figure 4.2.3 above, the Mackinnon P value is 0.4689 greater than, 0.05 significance which leads to acceptance of null hypothesis that states the series is not stationary.

FIGURE 4.2.4

Share Prices ADF Test Results

Augmented Dickey-Fuller test for unit root Number of obs = 46

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-1.963	-3.607	-2.941	-2.605

MacKinnon approximate p-value for Z(t) = 0.3030

D.SHARES	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
SHARES						
L1.	-.1254117	.0638891	-1.96	0.056	-.2542563	.0034328
LD.	.2717656	.1445911	1.88	0.067	-.0198302	.5633614
_cons	20.83887	10.56395	1.97	0.055	-.4653758	42.14311

Share prices series is also not stationary. From the ADF test exhibited by figure 4.2.4 above, the Mackinnon P value is 0.3030 greater than 0.05, significance level which leads to acceptance of the null hypothesis that states the series is not stationary.

4.3 Lag Order Selection Criteria

TABLE 4.3.1

Lag Selection Criteria Results

Selection-order criteria
Sample: 1960m6 - 1964m1 Number of obs = 44

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-548.15				933099	25.0977	25.1579	25.2599
1	-403.266	289.77	16	0.000	2675.24*	19.2394	19.5401*	20.0504*
2	-386.915	32.702*	16	0.008	2684.65	19.2234*	19.7648	20.6832
3	-375.066	23.697	16	0.096	3405.76	19.4121	20.1941	21.5207
4	-362.467	25.198	16	0.066	4378.37	19.5667	20.5893	22.3241

Table 4.3.1 above indicate lag selection criterion. The lag will aid in co-integration test and later in VAR or VECM. From the table; FPE, HQIC and SBIC recommend that the lag to be used should be one. On the other hand, LR and AIC recommend lag 2. Since lag one is recommended by more than two lag selection criterion, then the lag to be used in subsequent tests and model will be 1.

4.4 Johansen Test for Co-integration:

Johansen test for co-integration tests whether the series have long term association or relationship. Under this test, there are two hypothesis; null and alternative.

Null hypothesis; No co-integration

Alternative hypothesis; There is co-integration

The rule of the thumb is that, **w**hen trace statistic or max statistic is greater than critical values, we reject the null hypothesis hence accept the alternative hypothesis. When trace statistic and max statistic is less than critical values, we fail to reject the null hypothesis.

FIGURE 4.4.1

Johansen test for Co-integration Results

Johansen tests for cointegration

Trend: constant — Number of obs = 46

Sample: 1960m4 - 1964m1 — Lags = 2

maximum rank	parms	LL	eigenvalue	trace statistic	5% critical value
0	20	-431.91745	.	45.1123*	47.21
1	27	-420.43695	0.39296	22.1513	29.68
2	32	-412.79065	0.28283	6.8587	15.41
3	35	-410.71293	0.08638	2.7032	3.76
4	36	-409.36131	0.05707		

maximum rank	parms	LL	eigenvalue	max statistic	5% critical value
0	20	-431.91745	.	22.9610	27.07
1	27	-420.43695	0.39296	15.2926	20.97
2	32	-412.79065	0.28283	4.1554	14.07
3	35	-410.71293	0.08638	2.7032	3.76
4	36	-409.36131	0.05707		

From the results presented by figure 4.4.1 above, there is no co-integration since both trace statistic and max statistic are less than their critical values-null hypothesis is accepted. This means that, share prices, crude oil, diesel and LPG have no long term relationship. In the case there would have been co-integration, VECM should have been used. Therefore, VAR model is the suitable model to be used since there is no co-integration among the variables.

4.5 Differencing

Since the series; diesel, LPG and share prices are not stationary, to move forward to the next step, differencing them to become stationary is important so as to avoid spurious results. After the first difference, all series; crude oil, diesel, LPG and share prices became stationary. The Mackinnon P values are lower than 5% level of significance which leads to the conclusion that the series do not have unit root. These results are exhibited by figures 4.5.1, 4.5.2, 4.5.3 and 4.5.4 below.

FIGURE 4.5.1

Crude Oil Prices ADF Test After First Difference Results

Augmented Dickey-Fuller test for unit root Number of obs = 45

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-3.538	-3.614	-2.944	-2.606

MacKinnon approximate p-value for Z(t) = 0.0071

D.DlnCRUDE	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DlnCRUDE						
L1.	-.6188952	.1749107	-3.54	0.001	-.9718792	-.2659112
LD.	-.025856	.1543131	-0.17	0.868	-.3372724	.2855604
_cons	-.3070772	.4526773	-0.68	0.501	-1.220617	.6064626

FIGURE 4.5.2

Diesel ADF Test after the First Difference

Augmented Dickey-Fuller test for unit root Number of obs = 45

	Test Statistic	Interpolated Dickey-Fuller: 1% Critical Value	5% Critical Value	10% Critical Value
Z(t)	-4.322	-3.614	-2.944	-2.606

MacKinnon approximate p-value for Z(t) = 0.0004

D.DlnDIESEL	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DlnDIESEL						
L1.	-.9064358	.2097502	-4.32	0.000	-1.329729	-.4831428
LD.	.0263004	.1569334	0.17	0.868	-.290404	.3430049
_cons	-.456819	.5502754	-0.83	0.411	-1.56732	.6536817

FIGURE 4.5.3

LPG ADF Test After First Difference Results

```
. dfuller DlnLPG, regress lags(1)

Augmented Dickey-Fuller test for unit root         Number of obs   =        45

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -4.597            -3.614            -2.944            -2.606
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0001
```

D.DlnLPG	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DlnLPG						
L1.	-.9697655	.2109758	-4.60	0.000	-1.395532	-.5439991
LD.	.0827448	.1566153	0.53	0.600	-.2333177	.3988073
_cons	-.1404419	.3481754	-0.40	0.689	-.8430883	.5622044

FIGURE 4.5.4

Share Prices ADF Test after the First Difference Results

```
Augmented Dickey-Fuller test for unit root         Number of obs   =        45

                                 ------------ Interpolated Dickey-Fuller ------------
                 Test         1% Critical       5% Critical      10% Critical
               Statistic           Value             Value             Value
------------------------------------------------------------------------------
 Z(t)            -3.931            -3.614            -2.944            -2.606
------------------------------------------------------------------------------
MacKinnon approximate p-value for Z(t) = 0.0018
```

D.DlnSHARES	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
DlnSHARES						
L1.	-.7484276	.1904004	-3.93	0.000	-1.132671	-.3641841
LD.	-.0230546	.1517189	-0.15	0.880	-.3292358	.2831267
_cons	.3512734	1.097793	0.32	0.751	-1.864163	2.56671

4.6 Vector autoregression model

To begin with, there is no long term association among the variables (no co-integration). This lives only short run relationship for discussion. Looking at figure 4.6.1 below, crude oil has a short run positive relationship (coefficient; 0.4412%) with the share prices index. Diesel has a negative short term relationship (coefficient;-1.0856%) with the manufacturing firms share prices index. The relationships are further not significant since their P values; crude oil and diesel are 0.146 and 0.562 greater than 0.05, significance level. On the other hand, LPG prices have a positive short run relationship with manufacturing share prices index. Its coefficient is 1.4419%. The relationship is significant since its P value 0.017 is less than 0.05, significance level.

FIGURE 4.6.1

Vector Autoregression Results

Vector autoregression

Sample: 1960m4 - 1964m1		No. of obs	= 46
Log likelihood = -431.9175		AIC	= 19.64858
FPE = 4025.988		HQIC	= 19.94642
Det(Sigma_ml) = 1681.617		SBIC	= 20.44365

Equation	Parms	RMSE	R-sq	chi2	P>chi2
DlnSHARES	5	7.08612	0.1570	8.565338	0.0729
DlnCRUDE	5	2.89534	0.1854	10.46664	0.0333
DlnDIESEL	5	3.48726	0.0888	4.483436	0.3445
DlnLPG	5	2.35602	0.0215	1.009552	0.9083

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
DlnSHARES						
DlnSHARES						
L1.	.2534465	.1389045	1.82	0.068	-.0188014	.5256943
DlnCRUDE						
L1.	.441219	.7602682	0.58	0.562	-1.048879	1.931317
DlnDIESEL						
L1.	-1.085667	.7467127	-1.45	0.146	-2.549197	.3778629
DlnLPG						
L1.	1.44193	.6018883	2.40	0.017	.2622503	2.621609
_cons	.0402212	1.007067	0.04	0.968	-1.933594	2.014036
DlnCRUDE						
DlnSHARES						
L1.	-.046973	.0567555	-0.83	0.408	-.1582118	.0642658
DlnCRUDE						
L1.	.6658674	.3106409	2.14	0.032	.0570223	1.274712
DlnDIESEL						
L1.	-.3991006	.3051022	-1.31	0.191	-.99709	.1988887
DlnLPG						
L1.	.2153621	.2459279	0.88	0.381	-.2666476	.6973719
_cons	-.3126445	.4114814	-0.76	0.447	-1.119133	.4938443
DlnDIESEL						
DlnSHARES						
L1.	-.0021884	.0683585	-0.03	0.974	-.1361686	.1317919
DlnCRUDE						
L1.	.571628	.3741479	1.53	0.127	-.1616883	1.304944
DlnDIESEL						
L1.	-.5070165	.3674768	-1.38	0.168	-1.227258	.2132248
DlnLPG						
L1.	.4022322	.296205	1.36	0.174	-.1783189	.9827832
_cons	-.3945251	.495604	-0.80	0.426	-1.365891	.5768409
DlnLPG						
DlnSHARES						
L1.	-.0147552	.0461835	-0.32	0.749	-.1052733	.0757628
DlnCRUDE						
L1.	.0957638	.2527769	0.38	0.705	-.3996699	.5911975
DlnDIESEL						
L1.	-.129666	.2482699	-0.52	0.601	-.6162661	.3569341
DlnLPG						
L1.	.1664893	.2001182	0.83	0.405	-.2257351	.5587137
_cons	-.0967315	.3348336	-0.29	0.773	-.7529932	.5595303

4.7 Granger Causality Test

TABLE 4.7.1

Granger Causality Results

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
DlnSHARES	DlnCRUDE	.3368	1	0.562
DlnSHARES	DlnDIESEL	2.1139	1	0.146
DlnSHARES	DlnLPG	5.7393	1	0.017
DlnSHARES	ALL	5.9748	3	0.113
DlnCRUDE	DlnSHARES	.68498	1	0.408
DlnCRUDE	DlnDIESEL	1.7111	1	0.191
DlnCRUDE	DlnLPG	.76687	1	0.381
DlnCRUDE	ALL	3.0467	3	0.384
DlnDIESEL	DlnSHARES	.00102	1	0.974
DlnDIESEL	DlnCRUDE	2.3342	1	0.127
DlnDIESEL	DlnLPG	1.844	1	0.174
DlnDIESEL	ALL	3.8082	3	0.283
DlnLPG	DlnSHARES	.10207	1	0.749
DlnLPG	DlnCRUDE	.14353	1	0.705
DlnLPG	DlnDIESEL	.27277	1	0.601
DlnLPG	ALL	.4694	3	0.926

From table 4.7.1 above, there is short run causality between LPG and the listed manufacturing firms share prices index. The P value of LPG is less than 0.05, level of significance which leads to rejection of null hypothesis and accept alternative hypothesis that states there is causality relationship. On the other hand there is no short run causality between crude oil, diesel and the share prices index of the listed manufacturing firms in Kenya. There is no short run causality among crude oil, diesel and LPG combined and share prices index of the listed manufacturing firms in Kenya.

4.8 Diagnostic Tests:

4.8.1 Autocorrelation test:

TABLE 4.8.1.1

Autocorrelation Test Results

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	10.8710	16	0.81738
2	12.9493	16	0.67646

H0: no autocorrelation at lag order

From table 4.8.1.1 results, there is no autocorrelation since the P values (0.8174 and 0.6765) at both lags are greater than 0.05 significance level hence null hypothesis is accepted.

4.8.2 Normality test:

TABLE 4.8.2.1

Normality Test Results

Jarque-Bera test

Equation	chi2	df	Prob > chi2
DlnSHARES	36.190	2	0.00000
DlnCRUDE	0.344	2	0.84191
DlnDIESEL	13.226	2	0.00134
DlnLPG	14.019	2	0.00090
ALL	63.780	8	0.00000

Ho; are not normally distributed

H1; residuals are normally distributed.

From the Jarque-Bera normality test as shown by table 6, residuals are not normally distributed apart from one series residuals-crude oil. This is because its P value 0.84191 is greater than 0.05 significance level prompting for acceptance of null hypothesis. The model is still desirable since one of the series residuals is normally distributed.

4.8.3 Stability Test:

TABLE 4.8.3.1

Stability Test Results

Eigenvalue stability condition

Eigenvalue	Modulus
.4613212	.461321
.09456636 + .1449645*i*	.173082
.09456636 - .1449645*i*	.173082
-.07166725	.071667

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

From the results obtained as shown in table 4.8.3.1, all the Eigen values lie within the unit circle implying that the VAR model is stable.

4.8.4 Multicollinearity Test:

FIGURE 4.8.4.1

Multicollinearity Test Results

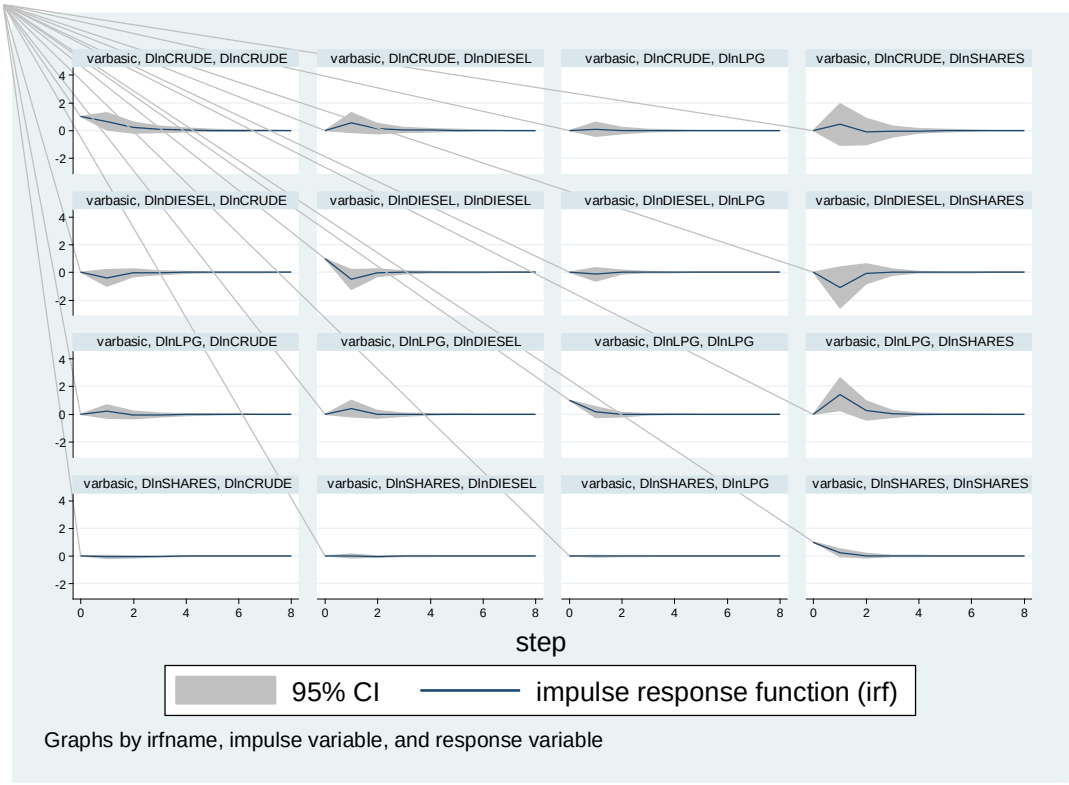
Variable	VIF	1/VIF
DlnDIESEL	6.54	0.152818
DlnCRUDE	5.19	0.192844
DlnLPG	1.83	0.545330
Mean VIF	4.52	

The mean VIF Is 4.52 less than 5 which implies that there is no multiolinearity.

4.9 Impulse Response Function

FIGURE 4.9.1

IRF Graphs



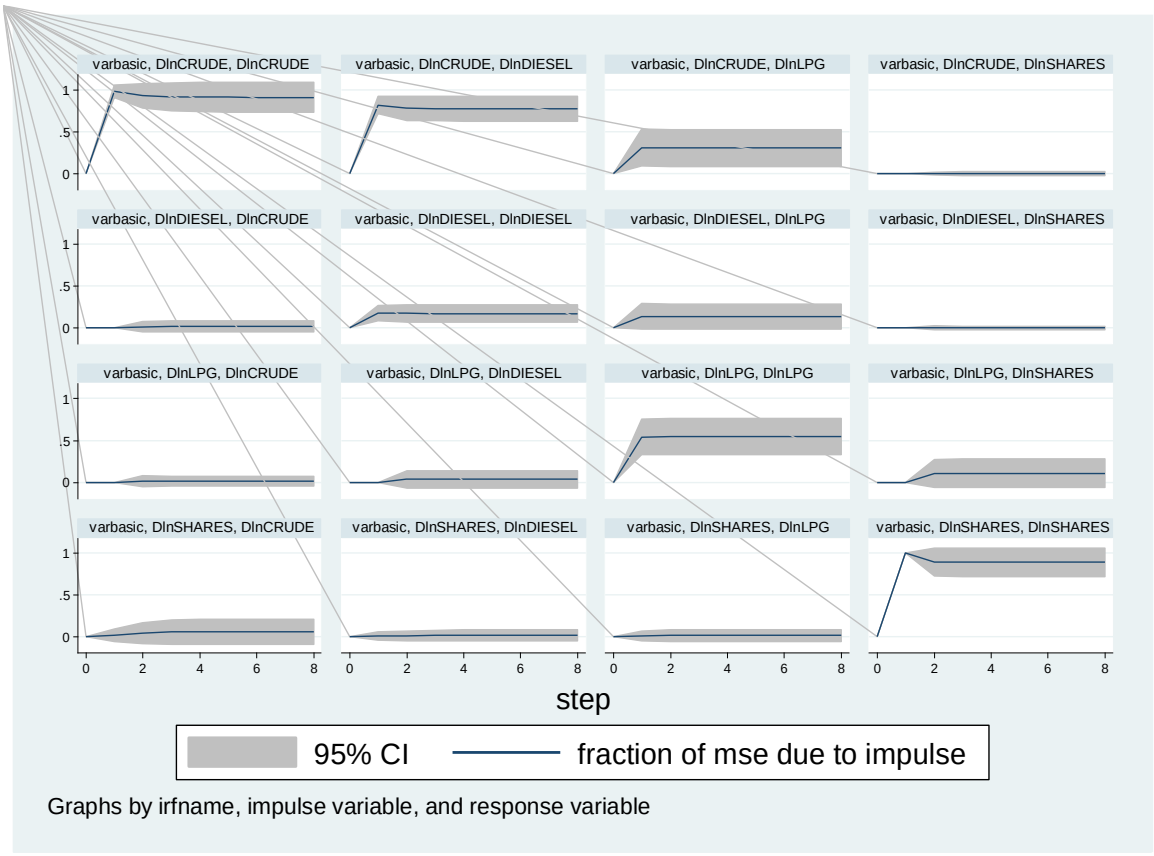
Impulse response function explains the shock response of one endogenous variable to another due to its standard deviation (impulse) based on a period of time. From figure 4.9.1 above, crude oil prices shocks standard deviation causes a positive response to the share prices index of manufacturing firms in the short run; after two months it stablizes. Diesel oil prices shocks standard deviation immediately causes a negative response on the share prices of manufacturing firms in the short-run; two months and there after it stablizes for the remaining periods. On the other hand, LPG (propane) prices shocks standard deviation causes a positive response on the share prices of manufacturing firms in the short run; 2 months and there after, it stablizes. The impact of crude oil and LPG shocks on manufacturing share prices are not the

same as diesel shocks. Diesel shocks impacts share prices negatively in the short run and after two months period it stabilizes. On the other hand, crude oil and LPG shocks impacts manufacturing shares positively in the short run and after two months it stabilizes.

4.10 Variance Decomposition

FIGURE 4.10.1

Variance Decomposition Results



Further explanations with tables:

TABLE 4.10.1

Variance Decomposition Results for Crude Oil Prices

step	(5) fevd	(5) Lower	(5) Upper
0	0	0	0
1	0	0	0
2	.001204	-.016891	.0193
3	.001586	-.021566	.024738
4	.001775	-.02307	.026621
5	.001821	-.02342	.027062
6	.00183	-.023499	.02716
7	.001832	-.023517	.027182
8	.001833	-.023521	.027187

Variance decomposition on the other hand looks at the variations in endogenous variables; what contributes to the shock of a particular endogenous variable. Looking at figure 4.10.1 results and table 4.10.1, there is no variation from period 0 to 1 caused by crude oil price shocks on the listed manufacturing firms' share prices index. However, from period 2 it increases steadily from 0.0247 to 0.027 in period 5 and then stabilizes.

TABLE 4.10.2

Variance Decomposition Results for Diesel

step	(9) fevd	(9) Lower	(9) Upper
0	0	0	0
1	0	0	0
2	.001828	-.020578	.024234
3	.001995	-.018842	.022832
4	.002028	-.018659	.022715
5	.002033	-.018626	.022692
6	.002033	-.01862	.022687
7	.002034	-.018618	.022685
8	.002034	-.018618	.022685

Looking at table 4.10.2 above, the variation in share prices is caused by diesel prices shocks from period 2 onwards. Form period 0 to 2, there is no variation and this can be confirmed from the graph above. At period 2, diesel prices shocks causes a negative 0.0206 variation on manufacturing share prices index. Thereafter, it stabilizes at negative 0.0186 from period 4 onwards.

TABLE 4.10.3

Variance Decomposition Results for LPG

step	(13) fevd	(13) Lower	(13) Upper
0	0	0	0
1	0	0	0
2	.105759	-.05877	.270287
3	.108803	-.061459	.279065
4	.108807	-.061415	.279028
5	.1088	-.061403	.279002
6	.108799	-.061401	.278999
7	.108798	-.061401	.278998
8	.108798	-.061401	.278998

Variance decomposition on the other hand looks at the variations in endogenous variables; what contributes to the shock of a particular endogenous variable. Looking at figure 4.10.1 results and table 4.10.3, there is no variation from period 0 to 1 caused by LPG shocks on manufacturing firms' share prices index. However, from period 2 it increases to positive 0.2702 and thereafter it stabilizes at positive 0.279 from period 4 onwards.

4.11 Findings and Discussions

This section discusses the results obtained from VAR, impulse response function and variance decomposition. In addition, it looks at how this study findings from the literature.

4.11.1 The relationship between crude oil and share prices of listed manufacturing firms

From VAR model, crude oil prices have a short run positive relationship with the share prices index of the listed manufacturing firms in Kenya. This relationship is however not significant. From the VAR model, positive coefficient of 0.4412% at lag 1 is exhibited that confirms the positive relationship. Impulse response function and variance decomposition further expands on the positive relationship. It confirms that crude oil has a positive shock on the share prices of the listed manufacturing firms in Kenya. This is clearly exhibited by the IRF and variance decomposition graphs. This findings is similar to those obtained by Sardosky (2001); Boyer & Filion (2004); Wattarnaton & Kanchapoom (2012). They found out that crude oil prices have a positive relationship with energy sectors.

4.11.2 The relationship between diesel and share prices of listed manufacturing firms

From VAR model, diesel prices have a short run negative relationship with the share prices index of the listed manufacturing firms in Kenya. This relationship is however not significant. From the VAR model, negative coefficient of 1.0856% at lag 1 is exhibited that confirms the negative relationship. Impulse response function and variance decomposition further expands on the negative relationship. It confirms that crude oil has a negative shock on the share prices of the listed manufacturing firms in Kenya. This clearly exhibited by the IRF and variance decomposition graphs. The findings of diesel relationship and share prices are similar to the findings of Onounga et al. (2011). In their research, they assert that diesel prices have a

negative impact to the financial performance of manufacturing firms in Kenya. However, these findings differ with the findings of Gatuhi and Macharia (2013). They found out that diesel prices have a significant and positive relationships with the share prices index of Nairobi all share index.

4.11.3 The relationship between LPG and share prices of listed manufacturing firms

From VAR model, LPG prices have a short run positive relationship with the share prices index of the listed manufacturing firms in Kenya. This relationship is significant. From the VAR model, positive coefficient of 1.4419% at lag 1 is exhibited that confirms the positive relationship. Impulse response function and variance decomposition further expands on the positive relationship. It confirms that LPG oil has a positive shock on the share prices of the listed manufacturing firms in Kenya. This is clearly exhibited by the IRF and variance decomposition graphs. Another important finding on LPG is that, it has a causality relationship with the hare prices index of listed manufacturing firms in Kenya. The findings of LPG prices can be compared with the findings obtained by Sardosky (2001); Boyer & Filion (2004); Wattarnaton & Kanchapoom (2012). They found out that crude oil prices have a positive relationship with energy sectors.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The study examined the relationship of oil prices; crude oil, diesel, LPG and share prices of listed manufacturing firms in Kenya for the period of September 2013 to August 2017. From the analysis, crude oil had a short run positive relationship with the share prices index of listed manufacturing firms in Kenya. Diesel had a short run negative relationship with the share prices index of listed manufacturing firms in Kenya. Lastly, LPG had a short run positive relationship with the share prices index of listed manufacturing firms in Kenya.

5.2 The Relationship Between Crude Oil and Share prices of Listed Manufacturing Firms

From the findings, crude oil prices had a short run positive relationship with the share prices index of listed manufacturing firms in Kenya. Some of the reasons as that explain the positive relationship are as follows. Crude oil is not directly used by the manufacturing firms. It has to be refined into other products such as diesel, gasoline and LPG for the manufactures to consume. Another reason is that crude oil is cheaper than diesel which is a refined product of crude oil.

5.3 The Relationship Between Diesel and Share prices of Listed Manufacturing Firms

Diesel prices had a short run negative relationship with the share prices index of listed manufacturing firms in Kenya. Diesel is widely used for electricity generation when there is no enough hydropower to generate electricity that is majorly used by manufacturing firms in Kenya. Diesel is used majorly in transportation and manufacturing firms rely on the same to transport their finished goods and raw materials. Lastly, diesel is used for heating purposes in some

manufacturing firms. This therefore contributes to the overall energy cost to rise which increases manufacturing firms' expenses that ultimately leads to less cash flows hence lowering the share prices.

5.3 The Relationship Between LPG and Share prices of Listed Manufacturing Firms

The relation between LPG and share prices is a positive one in the short run. Reason for this could be that LPG is cheaper source compared to other petroleum products. Also, it possesses unique characteristics that make it preferred by firms to other oil products. These characteristics are; cheap source of energy, clean and highly inflammable. As compared to diesel, LPG is not so widely used and this also might have led to the positive relationship between LPG and share prices index of the listed manufacturing firms in Kenya.

5.4 Recommendations of the Study

The study recommends that more periods should be incorporated in the future research to get a vivid and concrete picture of the relationship between oil prices and share prices. In years to come, studies should be carried out on the relationship between oil prices and the profits of firms in Kenya to get a direct relationship between oil prices and financial performance of firms.

5.5Limitation of the Study

This study only looked at the relationship of oil and share prices for 48 months due to cost constraints. Two companies were on the list of manufacturing firms because one got listed in mid year 2015 and another one got delisted from the Nairobi Securities Exchange. This poised a challenge of consistency in the data. Due to lack of enough data in regards to profits of the firms, this study opted to focus on the share prices of the listed manufacturing firms in Kenya.

5.6 Recommendations for further study

There are very few studies in Kenya that have looked at how oil prices affect the financial performance of firms and this still presents a wide lacuna for research. To begin with, more insight is needed on the relationship between oil prices and other sectors for instance, telecommunication, financial and even agricultural. Another area of concern that needs to be looked at is how taxes affect the prices of oil prices and how it affects the Kenyan economy.

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APPENDIX 1: List of the Listed Manufacturing Companies at the Nairobi Securities Exchange:

1. B.O.C Kenya Ltd
2. British American Tobacco Kenya Ltd
3. East African Breweries Kenya Ltd
4. Mumias Sugar Company
5. Unga Group Ltd
6. Kenya Orchards Ltd
7. Carbacid Ltd
8. A. Baumann Company Ltd.