

**THE EFFECT OF EXCHANGE RATE FLUCTUATIONS ON CHANGES  
IN RETAIL OIL PRICES IN KENYA**

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## **DECLARATION**

This research project is my original work and has not been submitted for a degree in any other university or college for examination/academic purposes.

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This Research Project has been submitted for examination with my approval as University Supervisor.

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## **DEDICATION**

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## **ABSTRACT**

The last half decade has seen extraordinary price fluctuations in the Kenya's oil market. Equally, the exchange rates (especially US dollar to Kenya's Shillings) have been characterized by significant fluctuations with the local currency hitting historical lows. Oil price levels can affect the world economy in many different ways. An increase in the oil price will raise the cost of production of goods and services in the economy so it will lead to an increase in price levels. Kenya adopted a floating exchange rate regime in 1993. Since then the exchange rates have been determined by the market forces of demand and supply. Undoubtedly, the changes in exchange rates do have a diverse effect across the economic spectrum in any country. This study was carried out to determine the effects of foreign currency exchange rate fluctuation on retail fuel prices in Kenya. The study used a quantitative descriptive research design. The target population for this study constituted the four main oil products retailed at the service stations namely Premium Motor Gasoline (PMS), Regular Motor Gasoline (RMS), Automotive Gas Oil (AGO) and Illuminating Kerosene (IK). This study analyzed average monthly retail prices for PMS, RMS, AGO and IK for Nairobi region for two and half years between January 2011 and June 2013. The study also analyzed the Central bank's monthly US Dollar to Kenyan Shilling exchange rate for the same period of study. The analysis on the movement of the two variables indicates a change in the same direction, a confirmation that indeed a change in foreign currency exchange rate affects retail fuel prices in a similar manner. This study however concludes that fluctuations in foreign currency exchange rate alone will not highly affect the retail oil prices in Kenya. The study is therefore consistent with previous studies that suggest that many other factors including taxes, spillage, dealer margins, transport rates as well as speculation determine changes in oil prices.



## **ABBREVIATIONS**

AGO – Automotive Gas Oil

IK – Illuminating Kerosene

ERC – Energy Regulatory Commission

KPC – Kenya Pipeline Company

KPRL – Kenya Petroleum Refineries Limited

OMCs – Oil Marketing Companies

OTS – Open Tendering System

PIEA – Petroleum Institute of East Africa

PMS – Premium Motor Gasoline

RMS – Regular Motor Gasoline

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Both fuel prices and the Shilling exchange rate are leading economic variables which drive the evolution of the Kenyan economy. Their changes deeply affect the country's competitiveness in international trade and other economic activities in various sectors. An important issue is therefore the link between these two key variables: are they moving independently or not? Do they move in the same direction? Is there causality between them? Are there theoretical grounds that could explain the channels of transmission? What are the empirical evidences on the statistical link between them?

The last half decade has seen extraordinary price fluctuations in the Kenya's oil market. Equally, the exchange rates (especially US dollar to Kenya's Shillings) have been characterized by significant fluctuations with the local currency hitting historical lows. Regimes in Kenya have been influenced through historical government macroeconomic policy from fixed exchange rate regimes to pegged and later floating through liberalization in the nineties. This volatility of the nominal exchange rates and the oil prices might have an impact on one another in the country yet no study has been carried out so far in Kenya to determine the correlation between these two variables.

Oil price levels can affect the world economy in many different ways. An increase in the oil price will raise the cost of production of goods and services in the economy so it will lead to an increase in price levels. While leading inflation, concerns about the likely increases in price level in the near future will also produce a negative sentiment in the financial markets. At the same time as affecting other asset classes' prices, oil price can set economic trends by dominating GDP growth. An oil price increase will also have an effect on a nation's wealth as it leads to a transfer of income from oil importing to oil exporting countries through a shift in the terms of trade. Through a shift in the balance of trade, exchange rates are also expected to change (Ibrahim Turhan et al. 2012).

Exchange Rate can be defined as the rate at which one currency may be converted into another. The exchange rate is used when simply converting one currency to another, such as for the purposes of travel to another country, or for engaging in speculation or trading in the foreign exchange market. There are a wide variety of factors which influence the exchange rate, such as interest rates, inflation, and the state of politics and the economy in each country. It is also called the rate of exchange or foreign exchange rate or currency exchange rate (Tauline, 2008).

### **1.1.1 Exchange Rate fluctuation**

The value of a currency in each country can be managed using different mechanisms. These mechanisms narrow down to the exchange rate regime which applies to the currency. The currency of a given country can either be said to be free floating, fixed or hybrid. For a free floating exchange rate, the currency is left to respond to the market forces. It is allowed to fluctuate against other currencies in response to the demand and supply forces. However, there are instances where the central banks intervene in order to regulate the appreciation and depreciation of the currencies. In such a case, these systems are called managed float and are different to the system where no intervention is done at all. In cases where there is no intervention, it is called free float (Tauline, 2008).

The fixed exchange rate regimes are those which have a direct convertibility towards the currency of another country. The government of a given country tries to always keep the value of the currency constant. The country gives the currency its worth in terms of a basket of other currencies, in terms of a fixed weight of gold, or a fixed amount of another currency. Here, the central bank of the country commits itself at all the times to do the buying and selling of its currency determined fixed rates (Evans, 2011).

Hybrid exchange rate regime consists of the crawling pegged system and horizontal pegged system. The market forces do not favour the use of a fixed exchange rate in absolute measures. At the same time, allowing the flexible free floating system may expose a country's currency to the volatility associated with exchange rates. The hybrid system is therefore necessary for a

combination of the two regimes. This allows for the currency fluctuation but guards against exposing it to the volatile markets (Frankel, 1993)

Kenya adopted a floating exchange rate regime in 1993. Since then the exchange rates have been determined by the market forces of demand and supply. Undoubtedly, the changes in exchange rates do have a diverse effect across the economic spectrum in any country. For instance, exchange rates will impact the cost of imports and value of exports in Kenya. If the cost of importing fuel is adversely affected by changes in exchange rates, the aftermath may be dire. Fuel costs determine the cost of production which may affect many sectors in the Kenyan economy, (Dan Chirchir, upcoming).

### **1.1.2 Fuel Retail pricing in Kenya**

Prior to mid-1994, the government, in consultation with the oil marketers, set consumer prices for petroleum products in the country (Mecheo and Omiti, 2003). However, since October 1994, the procurement, distribution, and pricing of petroleum products were liberalized with a view to enhancing operational efficiency of the industry and also attracting private capital (Mecheo and Omiti, 2003). In 2006, the Energy Act No. 12 of 2006 was enacted. This led to the transformation of the then Electricity Regulatory Board (ERB) to the Energy Regulatory Commission (ERC) to also regulate petroleum and renewable energy sectors in addition to electricity. Instability of pump prices of oil products forced the Government of Kenya to re-introduce price regulation in December 2010. Prior to re-introduction of price regulation, Kenya had tried to use the National Oil Company of Kenya (NOCK) to stabilize prices of oil products, without much success.

On December 15, 2010 the Government of Kenya enacted a new legislation, the Energy (Petroleum Pricing) Regulations, 2010 which was aimed at preserving availability of specified petroleum products in all parts of Kenya; stabilizing prices of specified petroleum products in Kenya and minimizing the variances in prices of specified petroleum products across the country (Katisya-Njoroge, 2010). The new regulations effectively re-introduced government control on the maximum prices of petroleum products based on a formula decided upon by the Energy

Regulation Commission (ERC). To date, ERC has the mandate to set monthly retail prices for PMS, RMS, AGO and IK.

According to data published in the ERC website, the following are some of the components factored in the determination of pump pricing formula; landed cost of crude delivered to the refinery and the final landed cost on refined petroleum products in dollars per litre; weighted average storage/ processing cost in shillings per litre in the Kenya Petroleum Refineries Limited (KPRL) and in Kipevu Oil Storage Facility (KOSF), Transport charges, Taxes and margins.

### **1.1.3 The Relationship between Exchange Rate and Fuel Prices.**

Earlier studies have noted the presence of a link between the value of the US dollar and the dollar price of crude oil. For instance, Krugman (1983a, 1983b) and Golub (1983) argued that rising oil prices transfer wealth from oil importers to oil exporters. With their additional wealth, exporters choose to invest in dollar assets. Such dollar asset purchases increase dollar demand, hence the dollar appreciates. It is worth noting that the direction of causation according to Krugman (1983a, 1983b) and Golub (1983) goes from oil prices to the value of the dollar.

Similarly, Amano and Norden (1998a, 1998b) found that the US real exchange rate and oil prices were cointegrated in the post Bretton Woods era, with the direction of causality going from oil prices to real exchange rates but not vice versa. More recently, BenassyQuere, et al., (2007) find causation running from oil prices to the dollar exchange rate at a 10% significance level for the period ending in the early 2000s. Coudert, et al., (2008) also suggest that the causality runs from oil prices to the dollar exchange rate. Their analysis covers the 1974 – 2004 time period and they find that the channel of transmission is through the US net international investment position.

Meanwhile, Medlock and Jaffe (2009) highlight the trade sector transmission mechanism – they propose that rising oil prices expand the US trade deficit which leads to a weaker dollar. The weak dollar in turn drives oil prices upward, and a self perpetuating cycle is started. Interestingly, Zhang, et al. (2008), in their examination of the spillover effect of the dollar exchange rate on crude oil prices during the period 2000 - 2005, find that dollar depreciation is a

contributing factor to high oil prices but the volatility spillover from the dollar foreign exchange market to the oil market is not statistically significant.

Chadhuri and Daniel (1998) find that oil prices affect the relative value of currencies in the United Arab Emirates. Some studies including Cooper (1994) and Brown (1986), establish causation in the opposite direction finding that in the case of OPEC members, and large industrial economies, respectively, exchange rate influence the price of oil.

Oil imports represent a significant fraction of the trade balance for energy-dependant economies. In the case of small open economies with floating exchange rates, the variability in oil prices is expected to have a large impact on the relative value of the currency. This relationship between the price of oil and the exchange rate has been established by a lot of literature for oil-producing countries but not for oil-importing countries like Kenya.

#### **1.1.4 The oil industry in Kenya**

The Kenyan oil industry is controlled by the major oil companies which include; Total Kenya limited, Kenol Kobil Limited, Shell Kenya limited (VIVO), Oil Libya limited and National Oil Corporation of Kenya. According to information posted on ERC website, the five companies control a market share of over seventy five percent.

Kenya solely relies on oil imports to satisfy its oil energy needs. According to Kojima et al. (2010) Kenya has an Open Tender System, whereby crude or petroleum products are purchased by a single company for the entire market on the basis of a public tender and shared among all marketing companies in proportion to their share of the market. The Government of Kenya (2003) in its Vision 2030 recognizes that Kenya's energy costs are higher than those of her competitors and that Kenya must, therefore, generate more energy at a lower cost and increase efficiency in energy consumption.

Kenya's crude imports are made up of about 90% Murban crude oil from Abu Dhabi, marketed by the Abu Dhabi National Oil Company (ADNOC). Early each month ADNOC sets the Official

Selling Price (OSP) of Murban crude oil lifted during the previous month. This is determined in Dollars per Barrel (USD/Bbl). This becomes the Free On Board (FOB) loading port price applicable to the tenders called in Kenya (ERC, 2010). International prices for refined petroleum products are available on daily basis in such publications as Platt's and Reuters for the major trading markets. For imports into Kenya the relevant prices are those in the Arabian Gulf (AG) and the Mediterranean Sea (MED). Quotations for trading are based on the mean prices for 3-5 days around the bill lading (B/L) day as FOB price plus a freight and premium component. For the purpose of the OTS, tenderers quote a fixed Freight and Premium figure to bring the specific product from the loading port to Mombasa. The tender document specifies the vessel arrival date and therefore indirectly fixes the loading date range (ERC, 2010).

The Kenya Government has been encouraging foreign interest in oil exploration thus there is a modest upstream oil industry, currently limited to exploration in various parts of Kenya. There has been a confirmation that Kenya has struck oil in Turkana area but the commercial viability of these discoveries is yet to be determined. Petroleum is Kenya's major source of commercial energy and has, over the years, accounted for about 80% of the country's commercial energy requirements (Wanjiku, 2011). According to Vision 2030, petroleum and electricity are the prime movers of the modern sector of the Kenyan economy.

## **1.2 Research Problem**

Oil is an important variable in driving the economies of all countries in the world but despite this, oil prices have been going through fluctuations and instability, often affecting the efficiency of the same in propelling growth (Kojima, 2009). The importance of prices of oil products to the economy cannot be emphasized. Increases in prices of oil products (especially those of automotive diesel) lead to general increases in prices of other essential commodities and services (Mecheo and Omiti, 2003). Oil price volatility surpassed most other raw materials' price volatility in the mid-1980s and this pattern continues today. Oil price controls in Kenya were introduced to ensure oil price stability but as demonstrated by public outcry each month after oil price reviews, price regulation has failed to achieve one of its key goals of stabilizing prices of oil products

Many studies related to the causal relationship between exchange rates and the oil prices have been done. Krugman (1980) employed a model to investigate the effect of an oil price increase on US dollar and found that US dollar will appreciate in the short run, however in the long run it will depreciate. Golub(1983) investigated the effect of oil prices increases on exchange rates and found that the differences in the response of foreign exchange markets to oil shocks seen in 1970's can be explained by the fundamentals. Relatively recent studies imply that the relationship between oil prices and exchange rates may not be constant through time and they can vary for different time periods. Lizardo and Mollick (2010) show that an increase in the real price of oil leads to a significant depreciation of the US dollar relative to oil exporting countries, however oil importer countries currency depreciated relative to US dollar in the same scenario. They also find that currencies of countries that are neither oil exporter nor importer have appreciated relative to US dollar when oil prices rise.

Kisaka and Mwasaru, (2012) did a study on the Causal Relationship between Exchange Rates and Stock Prices in Kenya. They performed a stationarity test in first level forms and first differences for the stock price index and the exchange rate. In particular, they tested whether stock prices and exchange rates are integrated of order zero,  $I(0)$ . The empirical evidence from their study shows that exchange rates Granger-causes stock prices in Kenya. According to the study, there is unidirectional causality from exchange rates to stock prices.

In conclusion, there is no empirical consensus on the causal relationship between exchange rates and retail oil prices. Moreover, none of the previous studies investigated the effects of exchange rates on oil prices with respect to the Kenyan context. But the fact that crude and other oil imports prices are mostly denominated in US dollars naturally leads to a question regarding the effects of Kenya's shillings depreciation or appreciation against particularly the US dollar to the retail oil prices in Kenya. This research intends to set up a framework for testing this issue in the light of our local experience.

The research question guiding the research is; what is the effect of foreign currencies exchange rate fluctuations on changes in retail oil prices in Kenya?



### **1.3 Objective of the Study**

To determine the effect of foreign currencies exchange rate fluctuations on changes in retail oil prices in Kenya.

### **1.4 Value of the Study**

Decision makers at various levels in the industry will gain value added information on the effects of exchange rate fluctuations on the retail oil prices as a key determinants of economic developments. The findings will in particular help the ERC as the sole price regulator of oil pump prices in setting up the prices at any given time. It will also help the government implement regulations and policy requirements on how to reduce negative movements of either Exchange rates or Oil prices that could be injurious to the economy.

Scholars will benefit from the literature around foreign Exchange Rates, Retail oil pricing and their relationship. Economists can use the model developed in this study to predict the likely outcome on changes of either of the variables under this study. Those in the oil industry, importers and exporters of crude and other related products, local entrepreneurs, will immensely benefit from this study. The study will guide them on implementation of clear Exchange Rates and pricing policies that will help in mitigating adverse effects on fluctuation of either of the variables.

The general public, as the main consumer of oil products have been grappling with figuring out how the fuel prices are determined. The study will give an insight on the potential effects of foreign exchange rates on the prices oil or any relationship that may exist between the two.

## **CHAPTER TWO LITERATURE REVIEW**

## **2.1 Introduction**

This chapter entails a thorough review on the previous literature about the subject under study. Various researchers, authors, analysts and scholars have made their own presentations and given their thoughts around this subject. The chapter begins with a theoretical review, highlighting the theories on exchange rate and pricing that have been put forward by various scholars. It also elaborates on the Empirical review on Exchange Rates, Oil Pricing and their relationships in other economies.

## **2.2 Theoretical Review**

The main aim of theoretical review is to highlight the critical points of current knowledge. It entails a collection of related concepts which will guide the researcher in determining what will be measured and in drawing relationships between the variables. Theoretical review establishes the importance of the topic by providing information needed to understand the study. A substantial amount of research has already been carried out on the relationship between exchange rates and oil prices. This research focuses on exchange rate variability, pricing of fuel in Kenya and their causal effects on one another.

### **2.2.1 The Purchasing Power Parity theory**

Purchasing power parity (PPP) theory holds that the nominal exchange rate between two currencies should be equal to the ratio of aggregate price levels between the two countries, so that a unit of currency of one country will have the same purchasing power in a foreign country. Our willingness to pay a certain price for foreign money must ultimately and essentially be due to the fact that this money possesses a purchasing power as against commodities and services in that country. On the other hand, when we offer so and so much of our own money, we are actually offering a purchasing power as against commodities and services in our own country. Our valuation of a foreign currency in terms of our own, therefore, mainly depends on the relative purchasing power of the two currencies in their respective countries (Alan M. Taylor & Mark P. Taylor, 2004).

The PPP theory has a long history in economics, dating back several centuries, but the specific terminology of purchasing power parity was introduced in the years after World War I during the international policy debate concerning the appropriate level for nominal exchange rates among the major industrialized countries after the large-scale inflations during and after the war (Cassel, 1918).

Under the skin of any international economist lies a deep-seated belief in some variant of the PPP theory of the exchange rate, (Dornbusch and Krugman 1976). While few empirically literate economists take PPP seriously as a short-term proposition, most instinctively believe in some variant of purchasing power parity as an anchor for long-run real exchange rates (Rogoff 1996).

The question of how exchange rates adjust is central to exchange rate policy, since countries with fixed exchange rates need to know what the equilibrium exchange rate is likely to be and countries with variable exchange rates would like to know what level and variation in real and nominal exchange rates they should expect. In broader terms, the question of whether exchange rates adjust toward a level established by purchasing power parity helps to determine the extent to which the international macroeconomic system is self-equilibrating.

### **2.2.2 The Law of One Price**

The law of one price posits that for a standard commodity, prices in two markets expressed in common currency will not differ save for transport costs. The concept of the Law of One Price (LOOP) is one of the cornerstones the international finance theory textbooks are based on. The outcome of the LOOP, if it indeed holds, is non-existence of arbitrage opportunities. The absence of arbitrage, in its turn, is the premise on which the efficient market hypothesis rests on. Therefore, the validity of the LOOP is highly important for the financial markets.

There are a few main streams in financial literature that make use of the LOOP concept. One of them studies financial integration by testing the validity of the LOOP in capital markets. Akram, Rime and Sarno (2009), for example, examine the frequency, size and duration of inter-market price differentials for borrowing and lending services. Even though they test for the interest rate

parity (IRP), the criteria are related to the LOOP group to the extent that they focus on the analysis of onshore-offshore return differentials.

Another recent example is Yeyati, Schmukler and Van Horen (2009), who use cross market premium to assess financial integration. Another stream that uses the LOOP extensively focuses on price discovery. The logic of the LOOP is used in the following way: as prices of the same asset change on separate markets, both markets adjust to return to the LOOP.

### **2.2.3 The International Fisher Effect (IFE)**

International Fisher Effect (IFE) is a theory in international finance which asserts that the spot exchange rate between countries should move in opposite direction with the interest rate differential between these countries. In other words, according to the generalized Fisher Effect, high inflation countries should bear higher interest rates, if perfect integration of capital markets is achieved by financial markets. The theory asserts that the higher interest rate country's currency is expected to depreciate until the real returns of investments are equalized across countries.

Fisher theory simply argues that real interest rates across countries will be equal due to the possibility of arbitrage opportunities between financial markets which generally occurs in the form of capital flows. Real interest rate equality implies that the country with the higher interest rate should also have a higher inflation rate which, in turn, makes the real value of the country's currency decrease over time. In his empirical study, Throop (1994) mentions the importance of financial market integration for the IFE hypothesis and analyzes the real interest rate equality across five industrialized countries during the period of international integration of financial markets. Throop's results indicate no causal linkage between the US and foreign real rates during the period between 1981 and 1994. This evidence implies that central banks have been able to influence their domestic interest rates quite independently from the influence of interest rates abroad.

In another study, Juntilla (2001) extends the traditional Fisher equation through international direction by introducing foreign interest rates and exchange rates into the standard Fisher equation. He first tests the traditional Fisher hypothesis for Finland and the results do not support the existence of a Fisher effect for monthly Finnish data for the period between 1987 and 1996. Second, by taking the international dependencies into account, the author tests the dependencies between the Finnish interest rates and rates from its close trade partners, Germany and US. Results of the tests provide supportive evidence for a positive long run relationship between nominal interest rates and inflation in Finland, and, moreover, tests of the augmented version of the Fisher equation indicate that the Finnish money market is not independent of the markets of those countries with which Finland has a high trading volume.

Wu (1999) examines the relationship between the exchange rate and interest rate differentials for Japan and Germany against the US for the period between 1974 and 1996. In order to test for a long run relationship, Johansen's co-integration test is applied to data. Results are in favour of the existence of a long run relationship between real exchange rates and the expected real interest rate differentials. Another cross country analysis for the IFE is performed by Shalishali and Ho (2002) for eight industrialized countries: Canada, France, Germany, Japan, Netherlands, Sweden, Switzerland and UK. Quarterly data are used covering the period between 1972 and 1996. According to the authors, governments of industrialized countries are less likely to intervene in the foreign exchange markets and therefore, the results for these countries are expected to be more statistically significant in favour of the IFE.

### **2.3 Determinants of oil prices**

Oil price behaviour can be analyzed using three main approaches: the economics of exhaustible resources, the supply–demand framework and the informal approach (Fattouh, 2007). According to the exhaustible resources theory, oil prices must exhibit an upward trend (Krautkraemer, 1998). In contrast, under the supply–demand framework, the oil market is modeled using behavioral equations that link oil demand and supply to its various determinants, mainly GDP growth, oil prices and reserves (Dees et al., 2007). The informal approach is normally used to

identify economic, geo-political and incidental factors that affect demand and supply and hence oil price movements within specific contexts and episodes of oil market history (Fattouh, 2007).

Bacon (2009) found that taxes make up a sizable fraction of retail fuel in Cambodia. Taxes on petroleum products are a critical source of government revenue because it is one of the easiest ways to get revenue: collecting fuel taxes is relatively straightforward and there is generally a robust relationship between consumption of fuels as a group and income - consumption tends to go up at the same rate as income. The prices paid by consumers for a petroleum product may differ significantly from the ex-refinery price because of excise and value-added taxes which, in many countries, amount to a hefty imposition. This had a major effect on the financing of oil purchases as the cash outflow required now included taxes payable upfront on products at the point of entry. The indirect impact of the requirement that petroleum taxes be paid at the point of product entry, and its financing implications further complicate the impact of taxes on prices of petroleum products.

The US dollar is the invoicing currency of international crude oil trading. Exchange rate variations in the U.S. dollar can affect the world price of oil because oil is priced in US dollars and generally paid for in US dollars. The idea that there is a relationship between oil prices and exchange rates has been around for some time (Golub (1983) and Krugman (1983). Bloomberg and Harris (1995) provide a good description, based on the law of one price, of how exchange rate movements can affect oil prices. Commodities like oil are fairly homogeneous and internationally traded. The law of one price asserts that as the US dollar weakens relative to other currencies, *ceteris paribus*, international buyers of oil are willing to pay more US dollars for oil. Dale (2009) observes that economic models generally found a negative, but sometimes insignificant relationship between energy (or oil) prices and the Canadian dollar due to the offsetting impacts unique to energy prices, since the relationship between stronger prices of other non-energy commodities which Canada exports and the Canadian dollar was strongly positive. However, the study found that the price of oil is dominated by the U.S. dollars.

In a study on effects of oil price on government expenditures in Iran, Reza et al., (2008) observe that the changes in oil prices were earlier, in the 1970s, often influenced by oil marketing

companies and dealer profit margins. It was observed that the market was controlled by huge oil companies which were known as seven sisters and had the huge market power on production, refining, and distribution of oil. The oligopoly structure precluded them from price competition and provided them with a strong economic incentive not to increase the price. They kept the price stable and low because they made huge profit from the variety of products derived from crude oil.

Kieran and Dagmar (2010) provide a holistic examination of pricing and investment dynamics in India's downstream petroleum sector. They observed that in order to lessen the burden of dealing with petroleum prices, the government besides reduction of taxes is looking into the issue of oil spillage as a factor affecting the stability of oil prices in the region. This was being looked at in terms of the capacity of the country to have the right storage and distribution facilities to avoid oil losses.

Juvenal and Petrella (2012) found that oil prices have been historically driven by strength of global demand but speculation contributed to the oil price increases between 2004 and 2008. Consistent with Tang and Xiong (2011), they concluded that speculative shocks in oil prices had a relation to other commodity prices. However, Irwin and Sanders, (2010) disregard the idea that speculation played an important role in oil pricing indicating that the level of inventories had not risen in their period of study.

In Kenya, speculation has been considered to play a role in prices of oil products leading to many situations where the government agencies responsible for oil price regulation engage in endless counter claims with oil marketing companies in respect of the correct level of oil prices. This situation even led to the re-introduction of petroleum capping regulations by the Energy Regulatory Commission in 2010 as a way of ensuring oil marketing companies do not unnecessarily inflate prices of oil products. However speculators cannot withhold physical supply from the market and therefore cannot be responsible for rising oil prices. Moreover, the presence of large investors provides stability and liquidity to the commodities markets.

## 2.4 Empirical Review

Since the focus of this paper is on the effects of exchange rates on oil prices, I herewith concentrate on reviewing the empirical studies in this regard and summarize the Empirical evidence.

The results for a study by Amano and van Norden (1998) for the U.S.A were consistent with Akram (2004), Bergvall (2004), and Chadhuri and Daniel (1998) who find out that oil prices significantly affect the relative values of currencies in Norway, the four Nordic countries and several industrialized countries respectively. While discussing the determinants of equilibrium real exchange rates, Amano and van Norden (1998) propose a model with two sectors; tradable and non-tradable goods. Each sector uses both a tradable input (oil) and a non-tradable one (labour). Besides constant returns to scale technology, it assumes that inputs are mobile between the sectors and that both sectors do not make economic profits. The output price of the tradable sector is fixed internationally; hence the real exchange rate corresponds to the output price in the non-tradable sector. A rise in the oil price leads to a decrease in the labour price so as to meet the competitiveness requirement of the tradable sector. If the non-tradable sector is more energy intensive than the tradable one, its output price rises and real exchange rate appreciates. The opposite applies if the non-tradable sector is less energy intensive than the tradable one.

Accordingly, for oil importing country, a real oil price hike may increase the price of tradables relative to non-tradables by a bigger proportion than that in the oil exporting country and thus cause a real depreciation of their currencies. For oil exporting country, a real oil price increase may lead to appreciation of the real exchange rate as prices of non-tradable goods increase relative to tradables. However, due to the small-country assumption, Amano and van Norden (1998)'s approach neglects the fact that tradable prices can rise worldwide following an oil price shock. Thus, allowing for this possibility (while keeping the law of one price in the tradable sector) allows one to conclude that real oil price effect on real exchange rate will depend on the oil intensity of both tradable and non-tradable sectors of the countries under review (Benassy-Quere et al., 2007).



(Krugman, 1983) as well as (Golub, 1983) focuses on the balance of payments and international portfolio choices. (Krugman, 1983) notes that in a three-country world; Europe, America and OPEC, higher oil prices will transfer wealth from the oil importers (America and Europe) to oil exporters (OPEC). The real exchange rate equilibrium in the long run will depend on the geographic distribution of OPEC imports, but no longer on OPEC portfolio choices. Assuming that oil-exporting countries have a strong preference for dollar-denominated assets but not for US goods, an oil price hike will cause the dollar to appreciate in the short run but not in the long run.

In particular, (Krugman, 1983) posited that if America is a relatively small share of OPEC's export market but a large share of OPEC's import market, then the transfer of wealth from the industrial countries to OPEC would tend to improve the US trade balance. The introduction by (Golub, 1983) of a fourth country (the United Kingdom) and a third currency (the sterling) does not change the qualitative conclusions. Lizardo and Mollick (2010) show that an increase in the real price of oil leads to a significant depreciation of the US dollar relative to oil exporting countries, however oil importer countries currency depreciated relative to US dollar in the same scenario. They also find that currencies of countries that are neither oil exporter nor importer have appreciated relative to US dollar when oil prices rise. The results reported suggest that there is an important information transmission between commodity and currency world markets.

Narayan, Narayan and Prasad (2008) investigate the relationship between oil prices and the Fijian dollar -US dollar exchange rate using daily data for the period of 2000-2006. Their main result is that a rise in oil prices leads to an appreciation of the Fijian dollar. Similar results are reported by the authors who test for the significance of the relationship between oil prices and emerging markets stock prices. From a general point of view, a causality running from exchange rates to commodity prices can be derived based on an asset-pricing approach of exchange rate determination which links the present exchange rate to the discounted sum of futures fundamentals. However, owing to the fact that fundamentals and exchange rates are jointly determined in equilibrium, convincing empirical support for this theoretical established view has not been delivered (Chen et al., 2008).

If a commodity such as oil is denominated in dollar, a domestic appreciation against the dollar lowers the price of oil measured in terms of the domestic currency, which increases demand and may result in a general rise of oil prices (Akram, 2009). Effects on the supply side are not clear-cut. Positive effects may stem from an exchange rate driven rise in the oil price on drilling activities and production capacities although the latter causality has changed over time. On the other hand, a depreciation of the domestic currency may reduce purchasing power and shifts resources away from oil production which results in a decreasing supply (Coudert et al., 2008).

Providing evidence for a reversed causality, Cheng (2008) identifies an increase of the real (nominal) oil price as a response to a real (nominal) effective dollar appreciation. Other studies also conclude that the causality mainly runs from dollar exchange rates to oil prices. Yousefi and Wirjanto (2004) analyze 5 OPEC countries and provide evidence that crude oil export prices respond positively to depreciations against the dollar for the purpose of stabilizing export revenues. Focusing on nominal effective dollar exchange rates Krichene (2005, 2006) concludes that an appreciation of the nominal effective dollar exchange rate may lead to both an increase and a decrease in oil prices. With respect to the general link between exchange rates and commodity prices, Chen et al. (2008) find robust power of commodity currencies in predicting global commodity prices while their results provide little evidence for exchange rate predictability based on commodity prices.

Basher, Haug and Sadorsky (2010) also examined the relationship between oil prices, exchange rates and emerging markets stock prices for the period of 1988 to 2008. The authors study the relationship between oil prices and exchange rates and offer limited support for the relationship between these variables. In addition the authors find that while responding negatively to a positive oil price shock, oil prices respond positively to a positive emerging market shock. While interpreting these results, they emphasize that behavior of stock markets can be treated as a leading economic indicator since they signal the expectation of higher economic growth. This is especially the case after the financial crisis as emerging economies are leading the growth pattern of the global economy.

Another group of studies indicates that there is no causal relationship (the neutrality) between variables, implying that oil price and exchange rates do not provide a predictive power in forecasting future values of each other. The empirical evidence implying neutrality between oil prices and exchange rates is supported by Habib and Kalamova (2007) and Bjornland and Hungnes (2008) for Norway, Huang and Gou (2007) for China.

## **2.5 Summary and conclusions**

As Kenya moves into economic recovery and gears towards achieving the goals of ‘vision 2030’ over the next several years, the path of energy prices and what causes their changes will be key in the minds of Kenyans and the business community at large. Understanding the relationship between exchange rates and oil prices will equally remain an enormous task for economists, scholars and policy analysts in order to keep them in check.

Though there is a diverse body of literature on the relationship of oil prices and the Exchange rate, many of these studies have focused on the channels through which oil price shocks influence economic variables and exchange rates in the mature markets and oil exporting economies. The different results in the study imply that the relationship between oil prices and exchange rates can vary in different time periods. From the literature and empirical evidence review it is still not clear on the direction of the relationship between exchange rates and oil prices. In particular, there is no empirical consensus on the effects of exchange rates on retail oil prices. Moreover, none of the previous studies investigated this matter with respect to the Kenyan context.

This paper hopes to contribute by undertaking a simple statistical and economic analysis of the effects of exchange rates fluctuations on retail oil prices, using recent data in Kenya. A primary goal of my paper is to capture evidence of the presence of a link between retail oil prices and the value of the dollar to shillings exchange rate. Unlike the vast majority of literature available, this study concentrates on investigating the relationship between foreign exchange rates and retail oil

prices for an emerging market economy; Kenya. I will seek to confirm whether the results of my study will be in line with other previous studies done in relation to the same issue elsewhere.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter highlights the methodology adopted by the researcher in order to execute the study and realize its objective. It includes research design, population and sample design, data collection and data analysis.

### **3.2 Research Design**

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. It is the conceptual structure within which research is conducted; it constitutes the blue print for data collection, measurement and analysis of data. (Mugenda and Mugenda, 2003)

This research study used a quantitative descriptive design. According to Sarma & Misar (2006), descriptive research is defined as “Fact finding studies conducted to know the state of affairs as it exists”. In descriptive research the researcher has no control over the variables, report only objectively what had happened and tries to find out the causes of the variables and their behaviour. The emphasis is on specific objectives about the effects of changes in one variable on another variable and it involves an experiment where an independent variable is changed or manipulated to see how it affects a dependent variable. The study sought to establish and explain the effects of one variable on another; in this case, foreign currency exchange rates on retail fuel prices.

### **3.3 Population and Sample Design**

Oil Industry statistics indicate that petroleum dealers retail only four oil products through the pump at various service stations; Premium Motor Gasoline (PMS), Regular Motor Gasoline (RMS), Automotive Gas Oil (AGO) and Illuminating Kerosene (IK). The target population for this study constituted all the four products. This study analyzed average monthly retail prices for PMS, RMS, AGO and IK for Nairobi region for two and half years between January 2011 and June 2013. The study also analyzed the Central bank’s monthly US Dollar to Kenyan Shilling exchange rate for the same period of study.

### **3.4 Data Collection**

The study used secondary sources of data. Data for the monthly retail oil prices was collected from the ERC monthly gazette notices on price changes and quarterly published journals by PIEA. Other published data from Ministry of Energy statistics and industry reports and Ministry of Energy was used. Data for the exchange rates was based on the available information from the central bank of Kenya. The research further collected secondary data from published sources such as newspaper and websites so as to compare and enrich the above mentioned data sources.

### **3.5 Data Analysis**

Data on retail pump prices and US dollar to Kenya shillings exchange rates was analyzed. The researcher analyzed the relationship between the average monthly exchange rate and average monthly retail fuel pump prices for Nairobi region using Regression analysis. Regression analysis was used to find out whether exchange rate fluctuations as an independent variable has an influence on the changes in retail oil prices in Kenya.

The simple regression model took the form of:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

Where: Y = Average Retail pump price

$\beta_0$  = Constant Term;

$\beta_1$  = Beta coefficient;

X = Average Shillings to US Dollar Exchange rate

$\varepsilon$  = Error term

The information was analyzed in Microsoft office 2007 application and presented in figures, graphs and tables.

## **CHAPTER FOUR**

### **DATA ANALYSIS, RESULTS AND DISCUSSION**

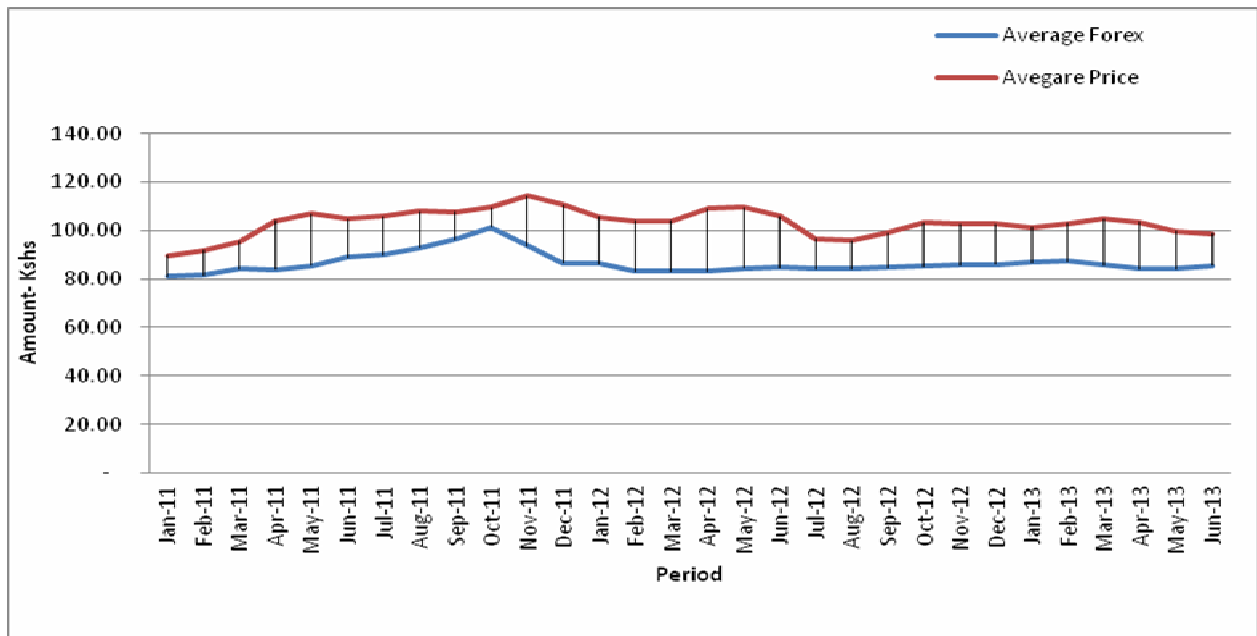
## **4.1 Introduction**

This chapter presents a summary on the information collected and processed during the study, analysis and discussion on the results of the study. The chapter is organized as follows; 4.2 provide descriptive statistics, 4.3 Regression results and 4.4 is the summary and conclusions.

## **4.2 Descriptive Analysis**

Data for AGO, IK, PMS and RMS monthly retail prices in the Nairobi region and the corresponding exchange rates for the period between January 2011 and June 2013 were obtained. The data for the fuel prices was obtained from the Quarterly journals as published by the Petroleum Institute of East Africa (PIEA) as well as the monthly gazette notices on fuel prices as released by the Energy Regulatory Commission (ERC). The data for the exchange rates was obtained from CBK. Based on the monthly data obtained two series were generated; one for average monthly fuel prices for the stated products in Nairobi region and the other for the average monthly exchange rates. Both series were plotted on one graph. The percentage changes from month to month for the two variables were also determined and their series plotted in a second graph.

**Figure 4.1: Movement of Average Retail price of fuel vs. Average Foreign Exchange rate.**

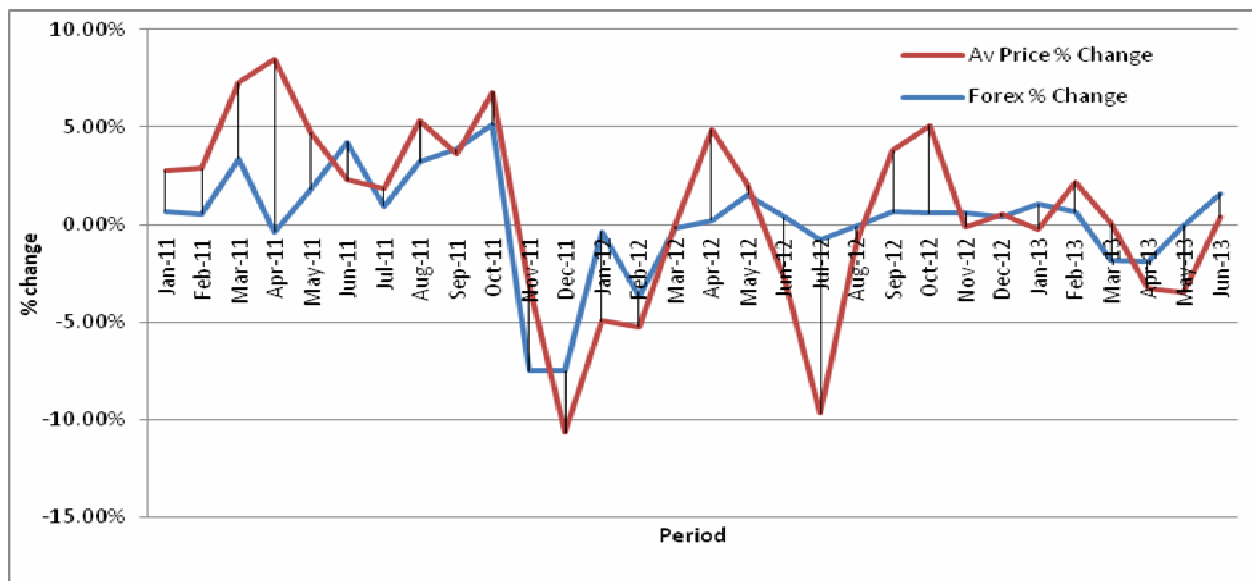


Source: Research Data, 2013

The study sought to establish the movement of average Retail fuel prices as compared to the average foreign exchange rate between January 2011 and June 2013. From the findings (Figure 4.1), both series are moving together. On average, the retail price of fuel has remained above the dollar rate for the entire period of study. The price is noted to be changing with change in the foreign exchange rate and in the same direction. However, the magnitude of average price change is higher than the corresponding change in average exchange rate. This is clearly shown in the graph on percentage changes of the two variables indicated below.



**Figure 4.2: Percentage Average Monthly fuel prices vs. Percentage Average Foreign Exchange Rate.**



Source: Research Data, 2013

By analyzing the trend on the graph in figure 4.2 above showing percentage change on foreign exchange rate against percentage change on monthly average prices in Nairobi region, I make important observations. The two series trend in the same direction. However, the percentage change in average price is stretching beyond the corresponding percentage change in exchange rate. This trend can be observed throughout the period with the change in average prices appearing to be higher than the corresponding change on exchange rate.

### 4.3 Regression Analysis

**Table 4.1: Regression Model results**

This table shows simple regression analysis.

Dependent variable: Average Retail Fuel Price - Y (Monthly data used)

Independent variable: Average foreign Exchange Rate – X (Monthly data used)

|                              |
|------------------------------|
| <i>Regression Statistics</i> |
|------------------------------|

|                   |                     |                       |               |                |                       |
|-------------------|---------------------|-----------------------|---------------|----------------|-----------------------|
| Multiple R        | 0.58104             |                       |               |                |                       |
| R Square          | 0.33761             |                       |               |                |                       |
| Adjusted R Square | 0.31395             |                       |               |                |                       |
| Standard Error    | 4.60707             |                       |               |                |                       |
| Observations      | 30.00000            |                       |               |                |                       |
| <b>ANOVA</b>      |                     |                       |               |                |                       |
|                   | <i>df</i>           | <i>SS</i>             | <i>MS</i>     | <i>F</i>       | <i>Significance F</i> |
| Regression        | 1.00000             | 302.90234             | 302.90234     | 14.27094       | 0.00076               |
| Residual          | 28.00000            | 594.30337             | 21.22512      |                |                       |
| Total             | 29.00000            | 897.20571             |               |                |                       |
|                   | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> |                       |
| Intercept         | 39.95037            | 16.77430              | 2.38164       | 0.02427        |                       |
| X Variable 1      | 0.73187             | 0.19374               | 3.77769       | 0.00076        |                       |

**Table 4.2: Regression Model summary**

|                   |                 |                          |                       |
|-------------------|-----------------|--------------------------|-----------------------|
| <b>Multiple R</b> | <b>R Square</b> | <b>Adjusted R Square</b> | <b>Standard Error</b> |
|-------------------|-----------------|--------------------------|-----------------------|

|                   |           |           |           |          |                       |
|-------------------|-----------|-----------|-----------|----------|-----------------------|
| 0.58104           | 0.33761   | 0.31395   | 4.60707   |          |                       |
|                   | <i>df</i> | <i>SS</i> | <i>MS</i> | <i>F</i> | <i>Significance F</i> |
| <b>Regression</b> | 1.00000   | 302.90234 | 302.90234 | 14.27094 | 0.00076               |
| <b>Residual</b>   | 28.00000  | 594.30337 | 21.22512  |          |                       |
| <b>Total</b>      | 29.00000  | 897.20571 |           |          |                       |

The model summary presented in table above, shows that the relationship was weak as the R square value was 0.34 which is not a good fit. This means only 34% of the variation on average retail fuel price is explained by the fluctuations on foreign currency exchange rates. However the results and the model are statistically reliable for prediction of Y as the F significance was 0.00076 meaning that the model might only be 0.076% wrong in its prediction. A reliable significance F must be below 0.05, precisely around 0.001.

**Table 4.3: Coefficient Table Results**

|                      | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> |
|----------------------|---------------------|-----------------------|---------------|----------------|
| <b>Intercept</b>     | 39.95037            | 16.77430              | 2.38164       | 0.02427        |
| <b>Exchange Rate</b> | 0.73187             | 0.19374               | 3.77769       | 0.00076        |

Just like the F significance, the independent variable's P – value is 0.00076. Mostly, all P – values must be below 0.05 to attain a strong reliability.

The regression line is  $Y = 39.95 + 0.732X$

I.e. Average Retail Fuel price = 39.95 + 0.732\*Average Foreign Exchange Rate.

This means for each unit increase in Foreign Exchange rate, Retail fuel price increases by 0.732 units.

#### 4.4 Chapter Summary and Conclusions

The study aimed at investigating the effects of foreign currency exchange rate fluctuations on changes in retail oil prices in Kenya. The study reveals that for the period between January 2011 and June 2013, average monthly retail prices moved in the same direction with average monthly US Dollar to shillings exchange rate in Kenya. However, an observation on the monthly percentage changes on the two variables indicate that the magnitude of average price change is higher compared to corresponding changes in foreign exchange rate.

The study further used regression analysis to determine whether foreign currency exchange rate fluctuation has any effect on changes in retail fuel prices. The simple regression model used was in the form of:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

Where: Y = Average Retail pump price

$\beta_0$  = Constant Term;

$\beta_1$  = Beta coefficient;

X = Average Shillings to US Dollar Exchange rate

$\varepsilon$  = Error term

The established equation was:

Average Retail Fuel price (Y) = 39.95 + 0.732\*Average Foreign Exchange Rate (X).

This means for each unit increase in Foreign Exchange rate, Retail fuel price increases by 0.732 units.

The model summary further shows that the relationship was weak as the R square value was 0.34 which is not a good fit. This means only 34% of the variation on average retail fuel price is explained by the fluctuations on foreign currency exchange rates. However the results and the model are statistically reliable for prediction of Y as the F significance was 0.00076 meaning that

the model might only be 0.076% wrong in its prediction. A reliable significance F must be below 0.05.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

## **5.1 Summary of Findings**

This study was undertaken with the sole objective of determining whether there is any effect of foreign currency exchange rate fluctuations on changes in retail fuel prices in Kenya. The last half decade has seen extraordinary price fluctuations in the Kenya's oil market. Equally, the exchange rates (especially US dollar to Kenya's Shillings) have been characterized by significant fluctuations with the local currency hitting historical lows. Oil is an important variable that drives the economies of all countries in the world. Its price fluctuations and instability often affects the efficiency of the same in propelling growth. Many studies done before argue for or against the idea that foreign currency exchange rate fluctuations affect the changes in fuel prices. This study therefore was done to indeed validate or refute the same in the context of the Kenyan oil sector.

This study analyzed average monthly retail prices for PMS, RMS, AGO and IK for Nairobi region for two and half years between January 2011 and June 2013. The study also analyzed the Central bank's monthly US Dollar to Kenyan Shilling exchange rate for the same period of study. The study used secondary sources of data. Data for the monthly retail oil prices was collected from the ERC monthly gazette notices on price changes and quarterly published journals by PIEA. Other published data from Ministry of Energy statistics and industry reports and Ministry of Energy was used. Data for the monthly exchange rates was based on the available information from the central bank of Kenya. The research further collected secondary data from published sources such as newspaper and websites so as to compare and enrich the sources.

The analysis revealed that for the period under study, the magnitude of retail price changes was higher than the corresponding change in foreign currency exchange rate. However, the two variables mainly moved in the same direction, month to month. Regression analysis further revealed that only 34% of the variation on average retail fuel price is explained by the fluctuations on foreign currency exchange rates. However the results and the model were statistically reliable for prediction of Y as the F significance was 0.00076; precisely within the mark of reliability.

## **5.2 Conclusions**

The study examined the effect of foreign currency exchange rate fluctuations on changes in retail oil prices in Kenya. The analysis on the movement of the two variables indicates a change in the same direction. The study therefore confirms that indeed a change in foreign currency exchange rate affects retail fuel prices in a similar manner. This study however concludes that fluctuations in foreign currency exchange rate alone will not highly affect the retail oil prices in Kenya. The study is therefore in line with previous studies that suggest that many other factors including taxes, spillage, dealer margins, transport rates as well as speculation determine changes in oil prices.

The results of the study are also consistent with other studies that suggest the effects of exchange rates fluctuation on oil prices. A study by Bloomberg and Harris (1995) provides a good description, based on the law of one price, of how exchange rate movements can affect oil prices. Their study asserts that since commodities like oil are fairly homogeneous and internationally traded, as the US dollar weakens relative to other currencies, *ceteris paribus*, international buyers of oil are willing to pay more US dollars for oil. Bloomberg and Harris (1995) find that, empirically the negative correlation between commodity prices and the US dollar increased after 1986. In addition to the theoretical and empirical work by Bloomberg and Harris (1995), empirical papers by Pindyck and Rotemberg (1990) and Sadorsky (2000) find that changes in exchange rates impact oil prices. Zhang, Fan, Tsai and Wei (2008) find a significant influence of the US dollar exchange rate on international oil prices in the long run, but short run effects are limited. Akram (2009) also finds that a weaker dollar leads to higher commodity prices.

## **5.3 Policy Recommendations**

The central bank should be empowered, both in terms of resources and human capacity to be in a position at all times to control the country's foreign exchange rate fluctuations, quite independently from the influence of currency changes abroad.

The government should streamline its taxation regulation to ensure that excise and value-added taxes do not amount to hefty imposition on OMCs who pass the same onto consumers. The

indirect impact of the requirement that petroleum taxes be paid at the point of product entry, and its financing implications mainly complicates the impact of taxes on prices of petroleum products.

In order to lessen the burden of dealing with petroleum prices, the government besides reduction of taxes should look into the issue of oil spillage. This should be looked at in terms of the capacity of the country to have the right storage and distribution facilities to avoid oil losses.

With the current fuel price regulation, OMCs' and dealers' margins are guaranteed. However, the government in collaboration with OMCs needs to check whether ERC's pricing formula caters for all necessary costs. This will determine whether poor financial performance of several OMCs is as a result of mainly the price regulation.

#### **5.4 Limitations of the Study**

The study is based on data that is historical. Therefore the findings of the study may not be fully applicable at the time of the study due to the dynamic operating environment in the Kenyan market. The study focused on the effects of only one variable on changes in retail oil prices. This alone may not adequately predict the direction and magnitude of the likely change without considering other parameters like changes in international oil prices, taxation rates, and demand. The study also concentrated on Nairobi region alone. Another major limitation was the time required to carry out the study, and multitasking between the tight schedule of the study and the demands of my current job.

The study also used regulated prices by ERC in comparison to the central bank's exchange rate. This was not consistent since ERC uses OTS importer's commercial bank mean rate on bill of lading date. This is because OMCs don't buy dollars from central bank of Kenya, but from commercial banks.



## **5.5 Suggestions for Further Studies**

The study acknowledges that indeed fuel retail prices are not affected by exchange rate fluctuations alone. It therefore, recommends that a study be carried out to determine the effects of other factors like international oil price movement, supply constraints and demand issues on retail oil prices.

The study further recommends for a study to determine the effects of changes in International fuel prices on changes of foreign exchange rate in Kenya. The study recommends that another study be carried out to determine whether there are any effects of other foreign currency fluctuations like the Euro, the pound etc on fuel prices.

This study has reviewed the effects of foreign currency fluctuations on changes in retail fuel prices in Kenya and made several policy recommendation. To this end therefore, a further study should be carried out to establish the possible challenges the government may face when implementing these policies.

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## **APPENDICES**

### **APPENDIX 1: LETTER OF INTRODUCTION**



**UNIVERSITY OF NAIROBI**  
**SCHOOL OF BUSINESS**  
**MBA PROGRAMME**

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P.O. Box 30197  
Nairobi, Kenya

DATE 02/09/2013

**TO WHOM IT MAY CONCERN**

The bearer of this letter PATRICK KIDIKO RAMOS

Registration No. D61/60210/2011

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.



**PATRICK NYABUTO**  
**MBA ADMINISTRATOR**  
**SCHOOL OF BUSINESS**

## APPENDIX 11: LIST OF RETAIL FUEL PRICES FROM PIEA

| Maximum pump prices (15th August 2013 to 14th September 2013)  |         |         |        |         |        |  |
|--|---------|---------|--------|---------|--------|--|
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 109.01  | 112.26  | 112.85 | 113.96  | 114.02 |  |
| Kerosene   | 81.14   | 83.93   | 84.69  | 85.72   | 85.72  |  |
| Automotive Diesel  | 101.21  | 104.44  | 105.25 | 106.36  | 106.42 |  |
| Maximum pump prices (15th July 2013 to 14th August 2013)       |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 106.27  | 109.52  | 110.12 | 111.23  | 111.29 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 76.71   | 79.49   | 80.27  | 81.30   | 81.29  |  |
| Automotive Diesel  | 99.63   | 102.86  | 103.68 | 104.79  | 104.85 |  |
| Maximum pump prices (15th June 2013 to 14th July 2013)         |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 104.93  | 108.18  | 108.79 | 109.90  | 109.96 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 78.74   | 81.52   | 82.29  | 83.32   | 83.31  |  |
| Automotive Diesel  | 95.94   | 99.16   | 99.98  | 101.09  | 101.15 |  |
| Maximum pump prices (15th May 2013 to 14th June 2013)          |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 109.99  | 113.24  | 113.86 | 114.94  | 115.00 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 76.68   | 79.46   | 80.24  | 81.26   | 81.26  |  |
| Automotive Diesel  | 97.84   | 101.06  | 101.88 | 102.99  | 103.05 |  |
| Maximum pump prices (15th April 2013 to 14th May 2013)         |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 114.38  | 117.65  | 118.21 | 119.32  | 119.38 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 81.03   | 83.83   | 84.59  | 85.62   | 85.61  |  |
| Automotive Diesel  | 103.21  | 106.44  | 107.25 | 108.36  | 108.42 |  |
| Maximum pump prices (15th March 2013 to 14th April 2013)       |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 114.43  | 117.69  | 118.26 | 119.37  | 119.43 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 85.74   | 88.54   | 89.29  | 90.32   | 90.31  |  |
| Automotive Diesel  | 104.13  | 107.37  | 108.17 | 109.28  | 109.34 |  |
| Maximum pump prices (15th February 2013 to 14th March 2013)    |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 110.32  | 113.57  | 114.16 | 115.27  | 115.33 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 83.14   | 85.93   | 86.69  | 87.72   | 87.71  |  |
| Automotive Diesel  | 102.96  | 106.20  | 107.10 | 108.12  | 108.18 |  |
| Maximum pump prices (15th January 2013 to 14th February 2013)  |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 108.34  | 111.60  | 112.19 | 113.30  | 113.36 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 81.07   | 83.86   | 84.62  | 85.65   | 85.64  |  |
| Automotive Diesel  | 100.76  | 103.99  | 104.80 | 105.91  | 105.97 |  |
| Maximum pump prices (15th December 2012 to 14th January 2013)  |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 109.35  | 112.61  | 113.20 | 114.31  | 114.37 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 83.65   | 86.44   | 87.20  | 88.23   | 88.22  |  |
| Automotive Diesel  | 102.56  | 105.79  | 106.60 | 107.71  | 107.77 |  |
| Maximum pump prices (15th November 2012 to 14th December 2012) |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 110.42  | 113.68  | 114.26 | 115.38  | 115.43 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 82.07   | 84.87   | 85.63  | 86.65   | 86.65  |  |
| Automotive Diesel  | 102.62  | 105.85  | 106.66 | 107.31  | 107.83 |  |
| Maximum pump prices (15th October 2012 to 14th November 2012)  |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 112.00  | 115.26  | 115.83 | 116.94  | 117.00 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 83.22   | 86.01   | 86.77  | 87.80   | 87.79  |  |
| Automotive Diesel  | 102.87  | 106.11  | 106.28 | 108.03  | 108.09 |  |
| Maximum pump prices (15th September 2012 to 14th October 2012) |         |         |        |         |        |  |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |  |
| Super Petrol   | 105.70  | 108.95  | 109.56 | 110.67  | 110.73 |  |
| Regular Petrol   | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |  |
| Kerosene   | 76.87   | 79.65   | 80.42  | 81.45   | 81.44  |  |
| Automotive Diesel  | 97.84   | 101.07  | 101.89 | 103.00  | 103.06 |  |

| Maximum pump prices (15th August 2012 to 14th September 2012) |         |         |        |         |        |
|---|---------|---------|--------|---------|--------|
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 103.25  | 106.48  | 107.11 | 108.22  | 108.28 |
| Regular Petrol  | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |
| Kerosene  | 71.20   | 73.97   | 74.76  | 75.79   | 75.78  |
| Automotive Diesel   | 93.87   | 97.09   | 97.92  | 99.03   | 99.09  |
| Maximum pump prices (15th July 2012 to 14th August 2012)      |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 105.22  | 108.46  | 109.08 | 110.19  | 110.25 |
| Regular Petrol  | 102.92  | 105.76  | 106.28 | 107.31  | 107.30 |
| Kerosene  | 71.63   | 74.40   | 75.19  | 76.22   | 76.21  |
| Automotive Diesel   | 94.28   | 97.50   | 98.33  | 99.44   | 99.50  |
| Maximum pump prices (15th June 2012 to 14th July 2012)        |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 114.40  | 117.67  | 118.24 | 119.35  | 119.41 |
| Regular Petrol  | 114.59  | 117.46  | 117.96 | 118.95  | 118.95 |
| Kerosene  | 80.41   | 83.20   | 83.96  | 84.99   | 84.99  |
| Automotive Diesel   | 102.27  | 105.51  | 106.32 | 107.43  | 107.49 |
| Maximum pump prices (15th May 2012 to 14th June 2012)         |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 117.85  | 121.13  | 121.67 | 122.78  | 122.84 |
| Regular Petrol  | 118.41  | 121.28  | 121.73 | 122.76  | 122.75 |
| Kerosene  | 84.20   | 87.00   | 87.76  | 88.78   | 88.78  |
| Automotive Diesel   | 105.20  | 108.44  | 109.24 | 110.35  | 110.41 |
| Maximum pump prices (15th April 2012 to 14th May 2012)        |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 115.23  | 118.50  | 119.06 | 120.17  | 120.23 |
| Regular Petrol  | 119.28  | 122.16  | 122.60 | 123.63  | 123.62 |
| Kerosene  | 83.48   | 86.28   | 87.03  | 88.06   | 88.05  |
| Automotive Diesel   | 105.55  | 108.80  | 109.60 | 110.71  | 110.77 |
| Maximum pump prices (15th March 2012 to 14th April 2012)      |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 108.44  | 111.69  | 112.29 | 113.40  | 113.46 |
| Regular Petrol  | 112.54  | 115.40  | 115.88 | 116.91  | 116.90 |
| Kerosene  | 81.34   | 84.13   | 84.90  | 85.92   | 85.92  |
| Automotive Diesel   | 101.89  | 105.12  | 105.93 | 107.04  | 107.10 |
| Maximum pump prices (15th February 2012 to 14th March 2012)   |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 108.07  | 111.32  | 111.92 | 113.03  | 113.09 |
| Regular Petrol  | 112.54  | 115.40  | 115.88 | 116.91  | 116.90 |
| Kerosene  | 80.95   | 83.74   | 84.51  | 85.53   | 85.53  |
| Automotive Diesel   | 102.05  | 105.29  | 106.09 | 107.20  | 107.26 |
| Maximum pump prices (15th January 2012 to 14th February 2012) |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 108.70  | 111.95  | 112.55 | 113.66  | 113.72 |
| Regular Petrol  | 112.54  | 115.40  | 115.88 | 116.91  | 116.90 |
| Kerosene  | 84.31   | 87.11   | 87.86  | 88.89   | 88.89  |
| Automotive Diesel   | 104.65  | 107.90  | 108.70 | 109.81  | 109.87 |
| Maximum pump prices (15th December 2011 to 14th January 2012) |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 115.79  | 119.06  | 119.62 | 120.73  | 120.79 |
| Regular Petrol  | 118.97  | 121.85  | 122.29 | 123.32  | 123.31 |
| Kerosene  | 87.93   | 90.74   | 91.48  | 92.51   | 92.50  |
| Automotive Diesel   | 107.72  | 110.98  | 111.77 | 112.88  | 112.94 |
| Maximum pump prices (15th November to 14th December 2011)     |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 120.85  | 124.13  | 124.66 | 125.77  | 125.83 |
| Regular Petrol  | 121.00  | 123.88  | 124.31 | 125.34  | 125.34 |
| Kerosene  | 92.05   | 94.87   | 95.60  | 96.63   | 96.62  |
| Automotive Diesel   | 111.04  | 114.30  | 115.08 | 116.19  | 116.25 |
| Maximum pump prices (15th October to 14th November 2011)      |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 117.22  | 120.50  | 121.05 | 122.16  | 122.22 |
| Regular Petrol  | 113.86  | 116.73  | 117.20 | 118.22  | 118.22 |
| Kerosene  | 87.14   | 89.95   | 90.69  | 91.72   | 91.71  |
| Automotive Diesel   | 107.69  | 110.94  | 111.73 | 112.84  | 112.90 |
| Maximum pump prices (15th September to 14th October 2011)     |         |         |        |         |        |
| PRODUCT   | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol  | 115.01  | 117.75  | 118.12 | 119.03  | 119.09 |
| Regular Petrol  | 113.82  | 116.68  | 117.15 | 118.18  | 118.17 |
| Kerosene  | 85.49   | 88.29   | 89.04  | 90.07   | 90.06  |
| Automotive Diesel   | 104.93  | 108.17  | 108.97 | 110.08  | 110.14 |



Source: PIEA



| Maximum pump prices (15th August to 14th September 2011) |         |         |        |         |        |
|--|---------|---------|--------|---------|--------|
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 113.44  | 117.22  | 117.99 | 119.30  | 119.36 |
| Regular Petrol   | 113.84  | 116.71  | 117.18 | 118.20  | 118.20 |
| Kerosene   | 86.16   | 88.96   | 89.71  | 90.73   | 90.73  |
| Automotive Diesel  | 105.73  | 108.97  | 109.77 | 110.88  | 110.94 |
| Maximum pump prices (15th July to 14th August 2011)      |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 112.12  | 115.39  | 116.47 | 117.58  | 117.64 |
| Regular Petrol   | 112.43  | 115.29  | 116.27 | 117.30  | 117.29 |
| Kerosene   | 83.37   | 86.16   | 87.15  | 88.17   | 88.17  |
| Automotive Diesel  | 102.88  | 106.12  | 107.20 | 108.31  | 108.37 |
| Maximum pump prices (15th June to 14th July 2011)        |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 112.07  | 114.93  | 115.91 | 116.94  | 116.93 |
| Regular Petrol   | 109.31  | 112.17  | 113.15 | 114.17  | 114.17 |
| Kerosene   | 82.91   | 85.71   | 86.69  | 87.72   | 87.71  |
| Automotive Diesel  | 103.06  | 106.30  | 107.38 | 108.49  | 108.55 |
| Maximum pump prices (15th May to 14th June 2011)         |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 112.09  | 115.35  | 116.43 | 117.54  | 117.60 |
| Regular Petrol   | 108.23  | 111.48  | 112.56 | 113.67  | 113.73 |
| Kerosene   | 89.40   | 92.61   | 93.69  | 94.80   | 94.86  |
| Automotive Diesel  | 104.77  | 108.02  | 109.10 | 110.21  | 110.27 |
| Maximum pump prices (Revised: 4th May to 14th May 2011)  |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 107.92  | 111.17  | 112.25 | 113.36  | 113.42 |
| Regular Petrol   | 104.92  | 108.16  | 109.25 | 110.36  | 110.42 |
| Kerosene   | 85.53   | 88.73   | 89.81  | 90.92   | 90.98  |
| Automotive Diesel  | 102.20  | 105.44  | 106.53 | 107.64  | 107.70 |
| Maximum pump prices (15th April to 3rd May 2011)         |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 107.92  | 111.17  | 112.25 | 113.36  | 113.42 |
| Regular Petrol   | 104.92  | 108.16  | 109.25 | 110.36  | 110.42 |
| Kerosene   | 87.70   | 90.91   | 91.99  | 93.10   | 93.16  |
| Automotive Diesel  | 104.28  | 107.52  | 108.60 | 109.71  | 109.77 |
| Maximum pump prices (15th March to 14th April 2011)      |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 99.28   | 102.44  | 103.50 | 104.58  | 104.64 |
| Regular Petrol   | 97.74   | 100.90  | 101.96 | 103.04  | 103.10 |
| Kerosene   | 80.86   | 83.97   | 85.03  | 86.12   | 86.17  |
| Automotive Diesel  | 91.39   | 94.53   | 95.59  | 96.67   | 96.73  |
| Maximum pump prices (15th February to 14th March 2011)   |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 94.93   | 98.08   | 99.14  | 100.22  | 100.28 |
| Regular Petrol   | 94.97   | 98.11   | 99.17  | 100.26  | 100.32 |
| Kerosene   | 76.42   | 79.52   | 80.58  | 81.67   | 81.73  |
| Automotive Diesel  | 88.59   | 91.72   | 92.78  | 93.87   | 93.92  |
| Maximum pump prices (15th January to 14th February 2011) |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 92.53   | 95.67   | 96.73  | 97.82   | 97.87  |
| Regular Petrol   | 94.03   | 97.17   | 98.23  | 99.32   | 99.37  |
| Kerosene   | 74.41   | 77.51   | 78.57  | 79.65   | 79.71  |
| Automotive Diesel  | 85.59   | 88.71   | 89.77  | 90.86   | 90.91  |
| Maximum pump prices (15th December to 14th January 2011) |         |         |        |         |        |
| PRODUCT  | MOMBASA | NAIROBI | NAKURU | ELDORET | KISUMU |
| Super Petrol   | 91.08   | 94.03   | 95.10  | 96.19   | 96.25  |
| Regular Petrol   | 91.44   | 94.39   | 95.45  | 96.55   | 96.60  |
| Kerosene   | 72.88   | 75.83   | 76.89  | 77.98   | 78.04  |
| Automotive Diesel  | 84.51   | 87.45   | 88.52  | 89.61   | 89.66  |

Source: PIEA

## APPENDIX III: FOREIGN CURRENCY EXCHANGE RATE FROM CBK

| Year   | Currency  | Buy    | Sell   | Mean   |
|--------|-----------|--------|--------|--------|
| Jan-11 | US DOLLAR | 80.94  | 81.12  | 81.03  |
| Feb-11 | US DOLLAR | 81.39  | 81.56  | 81.47  |
| Mar-11 | US DOLLAR | 84.12  | 84.29  | 84.21  |
| Apr-11 | US DOLLAR | 83.80  | 83.98  | 83.89  |
| May-11 | US DOLLAR | 85.34  | 85.52  | 85.43  |
| Jun-11 | US DOLLAR | 88.91  | 89.18  | 89.05  |
| Jul-11 | US DOLLAR | 89.79  | 90.00  | 89.90  |
| Aug-11 | US DOLLAR | 92.68  | 92.89  | 92.79  |
| Sep-11 | US DOLLAR | 96.21  | 96.51  | 96.36  |
| Oct-11 | US DOLLAR | 101.03 | 101.51 | 101.27 |
| Nov-11 | US DOLLAR | 93.51  | 93.84  | 93.68  |
| Dec-11 | US DOLLAR | 86.53  | 86.79  | 86.66  |
| Jan-12 | US DOLLAR | 86.21  | 86.48  | 86.34  |
| Feb-12 | US DOLLAR | 83.06  | 83.29  | 83.18  |
| Mar-12 | US DOLLAR | 82.90  | 83.10  | 83.00  |
| Apr-12 | US DOLLAR | 83.10  | 83.28  | 83.19  |
| May-12 | US DOLLAR | 84.37  | 84.56  | 84.46  |
| Jun-12 | US DOLLAR | 84.68  | 84.89  | 84.79  |
| Jul-12 | US DOLLAR | 84.05  | 84.24  | 84.14  |
| Aug-12 | US DOLLAR | 83.98  | 84.17  | 84.08  |
| Sep-12 | US DOLLAR | 84.52  | 84.71  | 84.61  |
| Oct-12 | US DOLLAR | 85.02  | 85.21  | 85.11  |
| Nov-12 | US DOLLAR | 85.54  | 85.72  | 85.63  |
| Dec-12 | US DOLLAR | 85.91  | 86.08  | 85.99  |
| Jan-13 | US DOLLAR | 86.81  | 86.99  | 86.90  |
| Feb-13 | US DOLLAR | 87.35  | 87.54  | 87.45  |
| Mar-13 | US DOLLAR | 85.71  | 85.92  | 85.82  |
| Apr-13 | US DOLLAR | 84.09  | 84.29  | 84.19  |
| May-13 | US DOLLAR | 84.05  | 84.24  | 84.15  |
| Jun-13 | US DOLLAR | 85.40  | 85.58  | 85.49  |

Source: Central Bank of Kenya.